GE HealthCare

Definium Pace Select

DICOM Conformance Statement

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ATTENTION

LES APPAREILS A RAYONS X SONT DANGEREUX A LA FOIS POUR LE PATIENT ET POUR LE MANIPULATEUR SI LES MESURES DE PROTECTION NE SONT PAS STRICTEMENT APPLIQUEES

Bien que cet appareil soit construit selon les normes de sécurité les plus severes, la source de rayonnement X représente un danger lorsque le manipulateur est non qualifié ou non averti. Une exposition excessive au rayonnement X entraîne des dommages a l'organisme. Par conséquent, toutes les précautions doivent être prises pour éviter que les personnes non autorisées ou non qualifées utilisent cet appareil créant ainsi un danger pour les autres et pour elles- mêmes. Avant chaque manipulation, les personnes qualifiées et autorisées à se servir de cet appareil doivent se renseigner sur les mesures de protection etablies par la Commission Internationale sur la Protection Radiologique, Annales 26 : Recommandations de la Commission Internationale sure la Protection Radiologique et les normes nationales en vigueur.

WARNING

RAY EQUIPMENT IS DANGEROUS TO BOTH PATIENT AND OPERATOR UNLESS MEASURES OF PROTECTION ARE STRICTLY OBSERVED.

Though this equipment is built to the highest standards of electrical and mechanical safety, the useful x-ray beam becomes a source of danger in the hands of the unauthorized or unqualified operator. Excessive exposure to x-radiation causes damage to human tissue.

Therefore, adequate precautions must be taken to prevent unauthorized or unqualified persons from operating this equipment or exposing themselves or others to its radiation.

Before operation, persons qualified and authorized to operate this equipment should be familiar with the Recommendations of the International Commission on Radiological Protection (ICRP), contained in Annals Number 26 of the ICRP, and with applicable national standards.

ATENCION

LOS APARATOS DE RAYOS X SON PELIGROSOS PARA EL PACIENTE Y EL MANIPULADOR CUANDO LAS NORMAS DE PROTECCION NO ESTAN OBSERVADAS

Aunque este aparato está construido según las normas de seguridad más estrictas, la radiacion X constituye un peligro al ser manipulado por personas no autorizadas o incompetentes. Una explosicion excesiva a la radiación X puede causar daños al organismo.

Por consiguiente, se deberán tomar todas las precauciones necesarias para evitar que las personas incompetentes o no autorizadas utilicen este aparato, lo que seria un peligro para los demás y para si mismas.

Antes de efectuar las manipulaciones, las personas habilitadas y competentes en el uso de este aparato, deberán informarse sobre las normas de protección fijadas por la Comisión Internacional de la Protección Radiológica, Anales No 26: Recomendaciones de la Comisión Internacional sobre la Protección Radiológica y normas nacionales.

ACHTUNG

RÖNTGENAPPARATE SIND EINE GEFAHR FUR PATIENTEN SOWIE BEDIENUNGSPERSONAL, WENN DIE GELTENDEN SICHERHEITSVORKEHRUNGEN NICHT GENAU BEACHTET WERDEN

Dieser Apparat entspricht in seiner Bauweise strengsten elektrischen und mechanischen Sichereitsnormen, doch in den Händen unbefugter oder unqualifizierter Personen wird er zu einer Gefahrenquelle.

Übermäßige Röntgenbestrahlung ist für den menschlichen Organismus schädlish.

Deswegen sind hinreichende Vorsichtsmaßnahmen erforderlich, um zu verhindern, daßunbefugte oder unqualifizierte Personen solche Geräte bedienen oder sich selbst und andere Personen deren Bestrahlung aussetzen können.

Vor Inbetriebnahme dieses Apparats solite sich das qualifizierte und befugte Bedienungspersonal mit den geltenden Kriterien für den gefahrlosen Strahleneinsatz durch sorgfältiges Studium des Hefts Nr. 26 der Internationalen Kommission für Strahlenschutz (ICRP) vertraut machen: Empfehlungen der Internationalen Kommission für Strahlenschutz und anderer nationaler Normenbehörden.

Important information

WARNING (EN)	This service manual is available in English only. • If a customer's service provider requires a language other than English, it is the customer's responsibility to provide translation services. • Do not attempt to service the equipment unless this service manual has been consulted and is understood. • Failure to heed this warning may result in injury to the service provider, operator or patient from electric shock, mechanical or other hazards.
ПРЕДУПРЕЖДЕНИЕ (BG)	Това упътване за работа е налично само на английски език. • Ако доставчикът на услугата на клиента изиска друг език, задължение на клиента е да осигури превод. • Не използвайте оборудването, преди да сте се консултирали и разбрали упътването за работа. • неспазването на това предупреждение може да доведе до нараняване на доставчика на услугата, оператора или пациента в резултат на токов удар, механична или друга опасност.
警告 (ZH-CN)	本维修手册仅提供英文版本。 • 如果客户的维修服务人员需要非英文版本，则客户需自行提供翻译服务。 • 未详细阅读和完全理解本维修手册之前，不得进行维修。 • 忽略本警告可能对维修服务人员、操作人员或患者造成电击、机械伤害或其他形式的伤害。
警告 (ZH-HK)	本服務手冊僅提供英文版本。 • 倘若客戶的服務供應商需要英文以外之服務手冊，客戶有責任提供翻譯服務。 • 除非已參閱本服務手冊及明白其內容，否則切勿嘗試維修設備。 • 不遵從本警告或會令服務供應商、網絡供應商或病人受到觸電、機械性或其他的危險。
警告 (ZH-TW)	本維修手冊僅有英文版。 • 若客戶的維修廠商需要英文版以外的語言，應由客戶自行提供翻譯服務。 • 請勿試圖維修本設備，除非 您已查閱並瞭解本維修手冊。 • 若未留意本警告，可能導致維修廠商、操作員或病患因觸電、機械或其他危險而受傷。
UPOZORENJE (HR)	Ovaj servisni priručnik dostupan je na engleskom jeziku. • Ako davatelj usluge klijenta treba neki drugi jezik, klijent je dužan osigurati prijevod. • Ne pokušavajte servisirati opremu ako niste u potpunosti pročitali i razumjeli ovaj servisni priručnik. • Zanemarite li ovo upozorenje, može doći do ozljede davatelja usluge, operatera ili pacijenta uslijed strujnog udara, mehaničkih ili drugih rizika.
VÝSTRAHA (CS)	Tento provozní návod existuje pouze v anglickém jazyce. • V případě, že externí služba zákazníkům potřebuje návod v jiném jazyce, je zajištění překladu do odpovídajícího jazyka úkolem zákazníka. • Nesnažte se o údržbu tohoto zařízení, aniž byste si přečetli tento provozní návod a pochopili jeho obsah. • V případě nedodržování této výstrahy může dojít k poranění pracovníka prodejního servisu, obslužného personálu nebo pacientů vlivem elektrického proudu, respektive vlivem mechanických či jiných rizik.
ADVARSEL (DA)	Denne servicemanual findes kun på engelsk. • Hvis en kundes tekniker har brug for et andet sprog end engelsk, er det kundens ansvar at sørge for oversættelse. • Forsøg ikke at servicere udstyret uden at læse og forstå denne servicemanual. • Manglende overholdelse af denne advarsel kan medføre skade på grund af elektrisk stød, mekanisk eller anden fare for teknikeren, operatøren eller patienten.

WAARSCHUWING (NL)	Deze onderhoudshandleiding is enkel in het Engels verkrijgbaar. • Als het onderhoudspersoneel een andere taal vereist, dan is de klant verantwoordelijk voor de vertaling ervan. • Probeer de apparatuur niet te onderhouden alvorens deze onderhoudshandleiding werd geraadpleegd en begrepen is. • Indien deze waarschuwing niet wordt opgevolgd, zou het onderhoudspersoneel, de operator of een patiënt gewond kunnen raken als gevolg van een elektrische schok, mechanische of andere gevaren.
HOIATUS (ET)	See teenindusjuhend on saadaval ainult inglise keeles • Kui klienditeeninduse osutaja nõuab juhendit inglise keelest erinevas keeles, vastutab klient tõlketeenuse osutamise eest. • Ärge üritage seadmeid teenindada enne eelnevalt käesoleva teenindusjuhendiga tutvumist ja sellest aru saamist. • Käesoleva hoiatuse eiramine võib põhjustada teenuseosutaja, operaatori või patsiendi vigastamist elektrilöögi, mehaanilise või muu ohu tagajärjel.
VAROITUS (FI)	Tämä huolto-ohje on saatavilla vain englanniksi. • Jos asiakkaan huoltohenkilöstö vaatii muuta kuin englanninkielistä materiaalia, tarvittavan käännöksen hankkiminen on asiakkaan vastuulla. • Älä yritä korjata laitteistoa ennen kuin olet varmasti lukenut ja ymmärtänyt tämän huolto-ohjeen. • Mikäli tätä varoitusta ei noudateta, seurauksena voi olla huoltohenkilöstön, laitteiston käyttäjän tai potilaan vahingoittuminen sähköiskun, mekaanisen vian tai muun vaaratilanteen vuoksi.
ATTENTION (FR)	Ce manuel d'installation et de maintenance est disponible uniquement en anglais. • Si le technicien d'un client a besoin de ce manuel dans une langue autre que l'anglais, il incombe au client de le faire traduire. • Ne pas tenter d'intervenir sur les équipements tant que ce manuel d'installation et de maintenance n'a pas été consulté et compris. • Le non-respect de cet avertissement peut entraîner chez le technicien, l'opérateur ou le patient des blessures dues à des dangers électriques, mécaniques ou autres.
WARNUNG (DE)	Diese Serviceanleitung existiert nur in englischer Sprache. • Falls ein fremder Kundendienst eine andere Sprache benötigt, ist es Aufgabe des Kunden für eine entsprechende Übersetzung zu sorgen. • Versuchen Sie nicht diese Anlage zu warten, ohne diese Serviceanleitung gelesen und verstanden zu haben. • Wird diese Warnung nicht beachtet, so kann es zu Verletzungen des Kundendiensttechnikers, des Bedieners oder des Patienten durch Stromschläge, mechanische oder sonstige Gefahren kommen.
ΠΡΟΕΙΔΟΠΟΙΗΣΗ (EL)	Το παρόν εγχειρίδιο σέρβις διατίθεται μόνο στα αγγλικά. • Εάν ο τεχνικός σέρβις ενός πελάτη απαιτεί το παρόν εγχειρίδιο σε γλώσσα εκτός των αγγλικών, αποτελεί ευθύνη του πελάτη να παρέχει τις υπηρεσίες μετάφρασης. • Μην επιχειρήσετε την εκτέλεση εργασιών σέρβις στον εξοπλισμό αν δεν έχετε συμβουλευτεί και κατανοήσει το παρόν εγχειρίδιο σέρβις. • Αν δεν προσέξετε την προειδοποίηση αυτή, ενδέχεται να προκληθεί τραυματισμός στον τεχνικό σέρβις, στο χειριστή ή στον ασθενή από ηλεκτροπληξία, μηχανικούς ή άλλους κινδύνους.
FIGYELMEZTETÉS (HU)	Ezen karbantartási kézikönyv kizárólag angol nyelven érhető el. • Ha a vevő szolgáltatója angoltól eltérő nyelvre tart igényt, akkor a vevő felelőssége a fordítás elkészíttetése. • Ne próbálja elkezdeni használni a berendezést, amíg a karbantartási kézikönyvben leírtakat nem értelmezték. • Ezen figyelmeztetés figyelmen kívül hagyása a szolgáltató, működtető vagy a beteg áramütés, mechanikai vagy egyéb veszélyhelyzet miatti sérülését eredményezheti.
AÐVÖRUN (IS)	Þessi þjónustuhandbók er aðeins fáanleg á ensku. • Ef að þjónustuveitandi viðskiptamanns þarfnast annas tungumáls en ensku, er það skylda viðskiptamanns að skaffa tungumálaþjónustu. • Reynið ekki að afgreiða tækið nema að þessi þjónustuhandbók hefur verið skoðuð og skilin. • Brot á sinna þessari aðvörun getur leitt til meiðsla á þjónustuveitanda, stjórnanda eða sjúklings frá raflosti, vélrænu eða öðrum áhættum.

AVVERTENZA (IT)	Il presente manuale di manutenzione è disponibile soltanto in lingua inglese. • Se un addetto alla manutenzione richiede il manuale in una lingua diversa, il cliente è tenuto a provvedere direttamente alla traduzione. • Procedere alla manutenzione dell'apparecchiatura solo dopo aver consultato il presente manuale ed averne compreso il contenuto. • Il mancato rispetto della presente avvertenza potrebbe causare lesioni all'addetto alla manutenzione, all'operatore o ai pazienti provocate da scosse elettriche, urti meccanici o altri rischi.
警告 (JA)	このサービスマニュアルには英語版しかありません。 ■サービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。 ■このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないでください。 ■この警告に従わない場合、サービスを担当される方、操作員あるいは患者 さんが、感電や機械的又はその他の危険により負傷する可能性があります。
경고 (KO)	본 서비스 매뉴얼은 영어로만 이용하실 수 있습니다. • 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우, 번역 서비스를 제공하는 것은 고객의 책임입니다. • 본 서비스 매뉴얼을 참조하여 숙지하지 않은 이상 해당 장비를 수리하려고 시도하지 마십시오. • 본 경고 사항에 유의하지 않으면 전기 쇼크, 기계적 위험, 또는 기타 위험으로 인해 서비스 제공자, 사용자 또는 환자에게 부상을 입힐 수 있습니다.
BRĪDINĀJUMS (LV)	Šī apkopes rokasgrāmata ir pieejama tikai angļu valodā. • Ja klienta apkopes sniedzējam nepieciešama informācija citā valodā, klienta pienākums ir nodrošināt tulkojumu. • Neveiciet aprīkojuma apkopi bez apkopes rokasgrāmatas izlasīšanas un saprašanas. • Šī brīdinājuma neievērošanas rezultātā var rasties elektriskās strāvas trieciena, mehānisku vai citu faktoru izraisītu traumu risks apkopes sniedzējam, operatoram vai pacientam.
ĮSPĖJIMAS (LT)	Šis eksploatavimo vadovas yra tik anglų kalba. • Jei kliento paslaugų tiekėjas reikalauja vadovo kita kalba – ne anglų, suteikti vertimo paslaugas privalo klientas. • Nemėginkite atlikti įrangos techninės priežiūros, jei neperskaitėte ar nesupratote šio eksploatavimo vadovo. • Jei nepaisysite šio įspėjimo, galimi paslaugų tiekėjo, operatoriaus ar paciento sužalojimai dėl elektros šoko, mechaninių ar kitų pavojų.
ADVARSEL (NO)	Denne servicehåndboken finnes bare på engelsk. • Hvis kundens serviceleverandør har bruk for et annet språk, er det kundens ansvar å sørge for oversettelse. • Ikke forsøk å reparere utstyret uten at denne servicehåndboken er lest og forstått. • Manglende hensyn til denne advarselen kan føre til at serviceleverandøren, operatøren eller pasienten skades på grunn av elektrisk støt, mekaniske eller andre farer.
OSTRZEŻENIE (PL)	Niniejszy podręcznik serwisowy dostępny jest jedynie w języku angielskim. • Jeśli serwisant klienta wymaga języka innego niż angielski, zapewnienie usługi tłumaczenia jest obowiązkiem klienta. • Nie próbować serwisować urządzenia bez zapoznania się z niniejszym podręcznikiem serwisowym i zrozumienia go. • Niezastosowanie się do tego ostrzeżenia może doprowadzić do obrażeń serwisanta, operatora lub pacjenta w wyniku porażenia prądem elektrycznym, zagrożenia mechanicznego bądź innego.
AVISO (PT-BR)	Este manual de assistência técnica encontra-se disponível unicamente em inglês. • Se outro serviço de assistência técnica solicitar a tradução deste manual, caberá ao cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica. • A não observância deste aviso pode ocasionar ferimentos no técnico, operador ou paciente decorrentes de choques elétricos, mecânicos ou outros.
ATENÇÃO (PT-PT)	Este manual de assistência técnica só se encontra disponível em inglês. • Se qualquer outro serviço de assistência técnica solicitar este manual noutro idioma, é da responsabilidade do cliente fornecer os serviços de tradução. • Não tente reparar o equipamento sem ter consultado e compreendido este manual de assistência técnica. • O não cumprimento deste aviso pode colocar em perigo a segurança do técnico, do operador ou do paciente devido a choques eléctricos, mecânicos ou outros.

ATENȚIE (RO)	Acest manual de service este disponibil doar în limba engleză. • Dacă un furnizor de servicii pentru clienți necesită o altă limbă decât cea engleză, este de datoria clientului să furnizeze o traducere. • Nu încercați să reparați echipamentul decât ulterior consultării şi înțelegerii acestui manual de service. • Ignorarea acestui avertisment ar putea duce la rănirea depanatorului, operatorului sau pacientului în urma pericolelor de electrocutare, mecanice sau de altă natură.
ОСТОРОЖНО! (RU)	Данное руководство по техническому обслуживанию представлено только на английском языке. • Если сервисному персоналу клиента необходимо руководство не на английском, а на каком-то другом языке, клиенту следует самостоятельно обеспечить перевод. • Перед техническим обслуживанием оборудования обязательно обратитесь к данному руководству и поймите изложенные в нем сведения. • Несоблюдение требований данного предупреждения может привести к тому, что специалист по техобслуживанию, оператор или пациент получит удар электрическим током, механическую травму или другое повреждение
UPOZORENJE (SR)	Ovo servisno uputstvo je dostupno samo na engleskom jeziku. • Ako klijentov serviser zahteva neki drugi jezik, klijent je dužan da obezbedi prevodilačke usluge. • Ne pokušavajte da opravite uređaj ako niste pročitali i razumeli ovo servisno uputstvo. • Zanemarivanje ovog upozorenja može dovesti do povređivanja servisera, rukovaoca ili pacijenta usled strujnog udara ili mehaničkih i drugih opasnosti.
UPOZORNENIE (SK)	Tento návod na obsluhu je k dispozícii len v angličtine. • Ak zákazníkov poskytovateľ služieb vyžaduje iný jazyk ako angličtinu, poskytnutie prekladateľských služieb je zodpovednosťou zákazníka. • Nepokúšajte sa o obsluhu zariadenia, kým si neprečítate návod na obluhu a neporozumiete mu. • Zanedbanie tohto upozornenia môže spôsobiť zranenie poskytovateľa služieb, obsluhujúcej osoby alebo pacienta elektrickým prúdom, mechanické alebo iné ohrozenie.
ATENCION (ES)	Este manual de servicio sólo existe en inglés. • Si el encargado de mantenimiento de un cliente necesita un idioma que no sea el inglés, el cliente deberá encargarse de la traducción del manual. • No se deberá dar servicio técnico al equipo, sin haber consultado y comprendido este manual de servicio. • La no observancia del presente aviso puede dar lugar a que el proveedor de servicios, el operador o el paciente sufran lesiones provocadas por causas eléctricas, mecánicas o de otra naturaleza.
VARNING (SV)	Den här servicehandboken finns bara tillgänglig på engelska. • Om en kunds servicetekniker har behov av ett annat språk än engelska, ansvarar kunden för att tillhandahålla översättningstjänster. • Försök inte utföra service på utrustningen om du inte har läst och förstår den här servicehandboken. • Om du inte tar hänsyn till den här varningen kan det resultera i skador på serviceteknikern, operatören eller patienten till följd av elektriska stötar, mekaniska faror eller andra faror.
OPOZORILO (SL)	Ta servisni priročnik je na voljo samo v angleškem jeziku. • Če ponudnik storitve stranke potrebuje priročnik v drugem jeziku, mora stranka zagotoviti prevod. • Ne poskušajte servisirati opreme, če tega priročnika niste v celoti prebrali in razumeli. • Če tega opozorila ne upoštevate, se lahko zaradi električnega udara, mehanskih ali drugih nevarnosti poškoduje ponudnik storitev, operater ali bolnik.
DİKKAT (TR)	Bu servis kılavuzunun sadece ingilizcesi mevcuttur. • Eğer müşteri teknisyeni bu kılavuzu ingilizce dışında bir başka lisandan talep ederse, bunu tercüme ettirmek müşteriye düşer. • Servis kılavuzunu okuyup anlamadan ekipmanlara müdahale etmeyiniz. • Bu uyarıya uyulmaması, elektrik, mekanik veya diğer tehlikelerden dolayı teknisyen, operatör veya hastanın yaralanmasına yol açabilir.

Legal notes

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Important precautions

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent, have notation "damage in shipment" written on all copies of the freight or express bill before delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14-day period.

To file a report, call 1-800-548-3366. Select the option for "Install Support Services for FOA and MIS." Contact your local service coordinator for more information on this process.

CERTIFIED ELECTRICAL CONTRACTOR STATEMENT

All electrical installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. In addition, electrical feeds into the Power Distribution Unit shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations and testing shall be performed by qualified GE HealthCare personnel. The products involved (and the accompanying electrical installations) are highly sophisticated, and special engineering competence is required. In performing all electrical work on these products, GE will use its own specially trained field engineers. All of GE's electrical work on these products will comply with the requirements of the applicable electrical codes.

The purchaser of GE equipment shall only utilize qualified personnel (i.e., GE's field engineers, personnel of third-party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

IMPORTANT...X-RAYPROTECTION

X-ray equipment if not properly used may cause injury. Accordingly, the instructions herein contained should be thoroughly read and understood by everyone who will use the equipment before you attempt to place this equipment in operation. GE HealthCare will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus incorporates a high degree of protection against x-radiation other than the useful beam, no practical design of equipment can provide complete protection. Nor can any practical design compel the operator to take adequate precautions to prevent the possibility of any persons carelessly exposing themselves or others to radiation.

It is important that anyone having anything to do with x-radiation be properly trained and fully acquainted with the recommendations of the National Council on Radiation Protection and Measurements (NCRP) as published in NCRP Reports available from NCRP Publications, 7910 Woodmont Avenue, Room 1016, Bethesda, Maryland 20814, and of the International Commission on Radiation Protection, and take adequate steps to protect against injury.

The equipment is sold with the understanding that GE HealthCare, its agents, and representatives have no responsibility for injury or damage which may result from improper use of the equipment.

Various protective materials and devices are available. It is urged that such materials or devices be used.

Lithium Battery Cautionary Statement

DANGER - Risk of Explosion

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

ATTENTION - Danger d'Explosion

Il y a danger d'explosion s'il y a replacement incorrect de la batterie.

Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur. Mettre au rébut les batteries usagées conformément aux instructions du fabricant.

TECHNICAL MANUAL UPDATES

When operating or servicing GE HealthCare products, please contact your GE representative for the latest revision of product documentation. Product documentation may also be available on-line at the GE HealthCare support documentation library.

OMISSIONS AND ERRORS

Customers, please contact your GE HealthCare sales or service representatives.

GE personnel, please use the GE HealthCare complaint handling process to report all omissions, errors, and defects in this publication.

Preface Publication Conventions

Standardized conventions for representing information is a uniform way of communicating information to a reader in a consistent manner. Conventions are used so that the reader can easily recognize the actions or decisions that must be made. There are a number of character and paragraph styles used in this publication to accomplish this task. Please become familiar with them before proceeding forward.

It is important that you read and understand hazard statements, and not just ignore them.

Safety & Hazard Information

Proper product safety labeling allows a person to safely use or service a product. The format and style for safety communications reflected in this publication represents the harmonization of IEC/ISO 3864 and ANSI Z535 standards.

Within this publication, different paragraph and character styles are used to indicated potential hazards. Paragraph prefixes, such as hazard, caution, danger and warning, are used to identify important safety information. Text (Hazard) styles are applied to the paragraph contents that are applicable to each specific safety statement.

Hazard Messages

Any action that will, could or potentially cause personal injury will be preceded by the safety alert symbol and an appropriate signal word. The safety alert symbol is the triangle with an exclamation mark within it. It Is always used next to the signal word to indicate the severity of the hazard.

Together, they are used to indicate a hazard exists.

Signal words describe the severity of possible human injures that may be encountered. The alert symbol and signal word are placed immediately before any paragraph they affect. Safety information includes:

1.) Signal Word - The seriousness level of the hazard.

2.) Symbol or Pictorial - The consequence of interaction with the hazard.

3.) Word Message:

   a.) The nature of the hazard (i.e. the type of hazard)

   b.) How to avoid the hazard.

The safety alert symbol is not used when an action can only cause equipment damage.

Text Format of Signal Words

DANGER - the most severe label, indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING - indicates a hazard with a medium level of risk which, if not avoided could result in death or serious injury.

Caution - indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

NOTICE - indicates information considered important, but not hazard-related (no risk of injury, only a risk to the equipment).

Symbols and Pictorials Used

The following Symbols and Pictorials are be used in this publication. These graphical icons (symbols) may be used to make you aware of specific types of hazards that could possibly cause harm.

NOTICE	CAUTION	WARNING	DANGER	
keep_up	magnetic	biohazard	compressgas	ppe-hearing
fragile	impact	corrosive	heavyobject	ppe-2people
static_elec	heat	general	laser	ppe-respitory
keep_dry	pinch	radiation	poisongas	ppe-loto
general	explosive	electrical	flammable	ppe-eye
torque	crush/mechanical	tipping	Read Manual	ppe-gloves
ce	instuction	poisonmatl	entanglement	instuction

Publication Conventions

General Paragraph and Character Styles

Prefixes are used to highlight important non-safety related information. Paragraph prefixes (such as Purpose, Example, Comment or Note) are used to identify important but non-safety related information. Text styles are also applied to text within each paragraph modified by the specific prefix.

EXAMPLES OF PREFIXES USED FOR GENERAL INFORMATION:

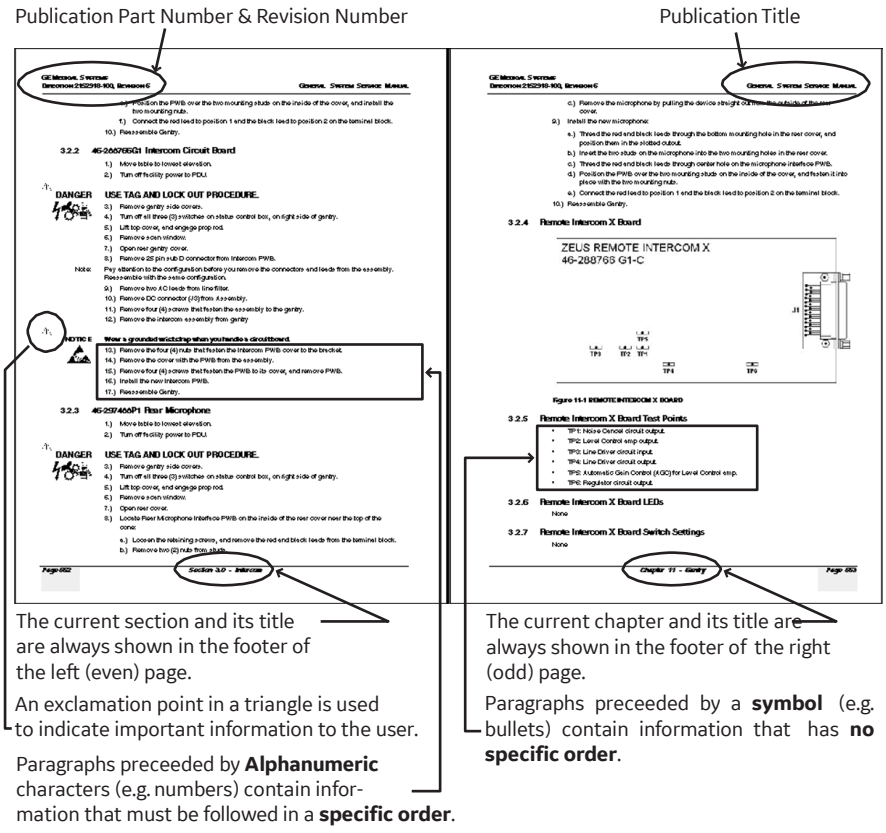
Purpose: Introduces and provides meaning as to the information contained within the chapter, section or subsection (such as used at the beginning this chapter, for example).

Note: Conveys information that should be considered important to the reader.

Example: Used to make the reader aware that the paragraph(s) that follow are examples of information possibly stated previously.

Comment: *Represents "additional" information that may or may not be relevant to your situation.*

Page Layout


Publication Part Number & Revision Number
Publication Title
The current section and its title are always shown in the footer of the left (even) page.
An exclamation point in a triangle is used to indicate important information to the user.
Paragraphs preceeded by **Alphanumeric** characters (e.g. numbers) contain information that must be followed in a **specific order**.
The current chapter and its title are always shown in the footer of the right (odd) page.
Paragraphs preceeded by a **symbol** (e.g. bullets) contain information that has **no specific order**.

Headers and footers in this publication are designed to allow you to quickly identify your location. The document part number and revision number appear in every header on every page. Odd numbered page footers indicate the current chapter, its title and current page number. Even page footers show the current section and its title, as well as the current page number.

Computer Screen Output/Input Text Character Styles

Within this publication, mono-spaced character styles (fonts) are used to indicate computer text that's either screen input or output. Mono-spaced fonts, such courier, are used to indicated text direction. When you type at your keyboard, you are generating computer input. Occasionally you will see the math operator "greater-than" and "less-than" symbols used to indicate the start and finish of variable output. When reading text generated by the computer, you are reading it as computer generated output. In addition to direction, characters are italicized (e.g. *italics*) to indicate information specific to your system or site.

Example:
Fixed Output

This paragraph's font represents computer generated screen "fixed" output. Its output is fixed from the sense that it does not vary from application to application. It is the most commonly used style used to indicate filenames, paths and text that do not change from system to system. The character style used is a fixed width such as courier.

Example:
Variable Output

This paragraph's font represents computer screen output that is "variable". It is used to represent output that varies from application to application or system to system. Variable output is sometimes found placed between greater-than and less-than operators for clarification. For example: <variable_ouput> or <3.45.120.3>. In both cases, the < and > operators are not part of the actual input.

Example:
Fixed Input

This paragraph's font represents fixed input. It is computer input that is typed-in via the keyboard. Typed input that does not vary from application to application or system to system. Fixed text the user is required to supply as input. For example: cd /usr/3p

Example:
Variable Input

This paragraph's font represents computer input that can vary from application to application or system to system. With variable text, the user is required to supply system dependent input or information. Variable input sometimes is placed between greater-than and less-than operators. For example: <variable_input>. In these cases, the (<>) operators would be dropped prior to input.
For example: *ypcat hosts | grep* <3.45.120.3> *would be typed into the computer as:*
ypcat hosts | grep *3.45.120.3*
without the greater-than and less-than operators.

Buttons, Switches and Keyboard Inputs (Hard & Soft Keys)

Different character styles are used to indicate actions requiring the reader to press either a hard or soft button, switch or key. Physical hardware, such as buttons and switches, are called hard keys because they are hard wired or mechanical in nature. A keyboard or on/off switch would be a hard key. Software or computer-generated buttons are called soft keys because they are software generated. Software driven menu buttons are an example of such keys. Soft and hard keys are represented differently in this publication.

Example: Hard Keys

A power switch **ON/OFF** or a keyboard key like **ENTER** is indicated by applying a character style that uses both over and under-lined bold text that is bold. This is a hard key.

Example: Soft Keys

Whereas the computer MENU button that you would click with your mouse or touch with your hand uses over and under-lined regular text. This is a soft key.

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CONFORMANCE STATEMENT OVERVIEW

Table 0.1 provides an overview of the network services supported by Definium Pacs Select

Table 0.1 – NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Computed Radiography Image Storage	Yes	Yes
Digital X-Ray Image Storage – For Presentation	Yes	Yes
Digital X-Ray Image Storage – For Processing	Yes	Yes
X-Ray Radiation Dose SR	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
Query/Retrieve		
Study Root Query/Retrieve Information Model – FIND	Yes	Yes
Study Root Query/Retrieve Information Model – MOVE	Yes	Yes
Print Management		
Basic Grayscale Print Management Meta SOP Class	Yes	No
Workflow Management		
Storage Commitment Push Model SOP Class	Yes	No
Modality Performed Procedure Step SOP Class	Yes	No
Modality Worklist Information Model – FIND SOP Class	Yes	No

Table 0.2 provides an overview of the Media Storage Application Profiles supported Definium Pace Select

Table 0.2 - MEDIA SERVICES

Media Storage Application Profile	Write Files (FSC / FSU)	Read Files (FSR)
Compact Disk – Recordable		
General Purpose CD-R	Yes / No	Yes
DVD		
General Purpose DVD-JPEG	Yes / No	No

Chapter 1 Introduction

1.1 Overview

This DICOM Conformance Statement is divided into sections as described below:

- Chapter 1 Introduction, which describes the overall structure, intent, and references for this Conformance Statement.
- Chapter 2 Network conformance statement, which specifies the GEHC equipment compliance to the DICOM requirements for the implementation of networking features.
- Chapter 3 Media Storage conformance statement, which specifies the GEHC equipment compliance to the DICOM requirements for the implementation of media storage features.
- Chapter 4 Digital X-ray information object implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of a digital X-ray information object implementation feature.
- Chapter 5 Study Root Query/Retrieve information model definition, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Study Root Query/Retrieve information model feature.
- Chapter 6 Modality Worklist information model definition, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of Basic Worklist Management Service feature.
- Chapter 7 Print Management SOP class definition, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Network Print Management SOP class.
- Chapter 8 Storage Commitment Push Model SOP class definition, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of the Storage Commitment Push Service feature.
- Chapter 9 Modality Performed Procedure Step implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of Performed Procedure Step (PPS) SCU features.
- Chapter 10 Security, which specifies the GEHC equipment compliance to secure communication with the implementation of DICOM Basic and AES TLS Secure Transport Connection Profile
- Chapter 11 Radiation Dose Structured Report information object implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of a Radiation Dose Structured Report (SR).
- Chapter 12 Audit Trail Messages, which specifies the GEHC equipment compliance to DICOM Specific Audit Message that radiography System can detect and report.
- Chapter 13 Secondary Capture Image information object implementation, which specifies the GEHC equipment compliance to DICOM requirements for the implementation of Secondary Capture (SC) Image.

1.2 Overall DICOM conformance statement document structure

The documentation structure of the GEHC Conformance Statements and their relationship with the DICOM V3.0 Conformance Statements is shown in Figure 1-1.

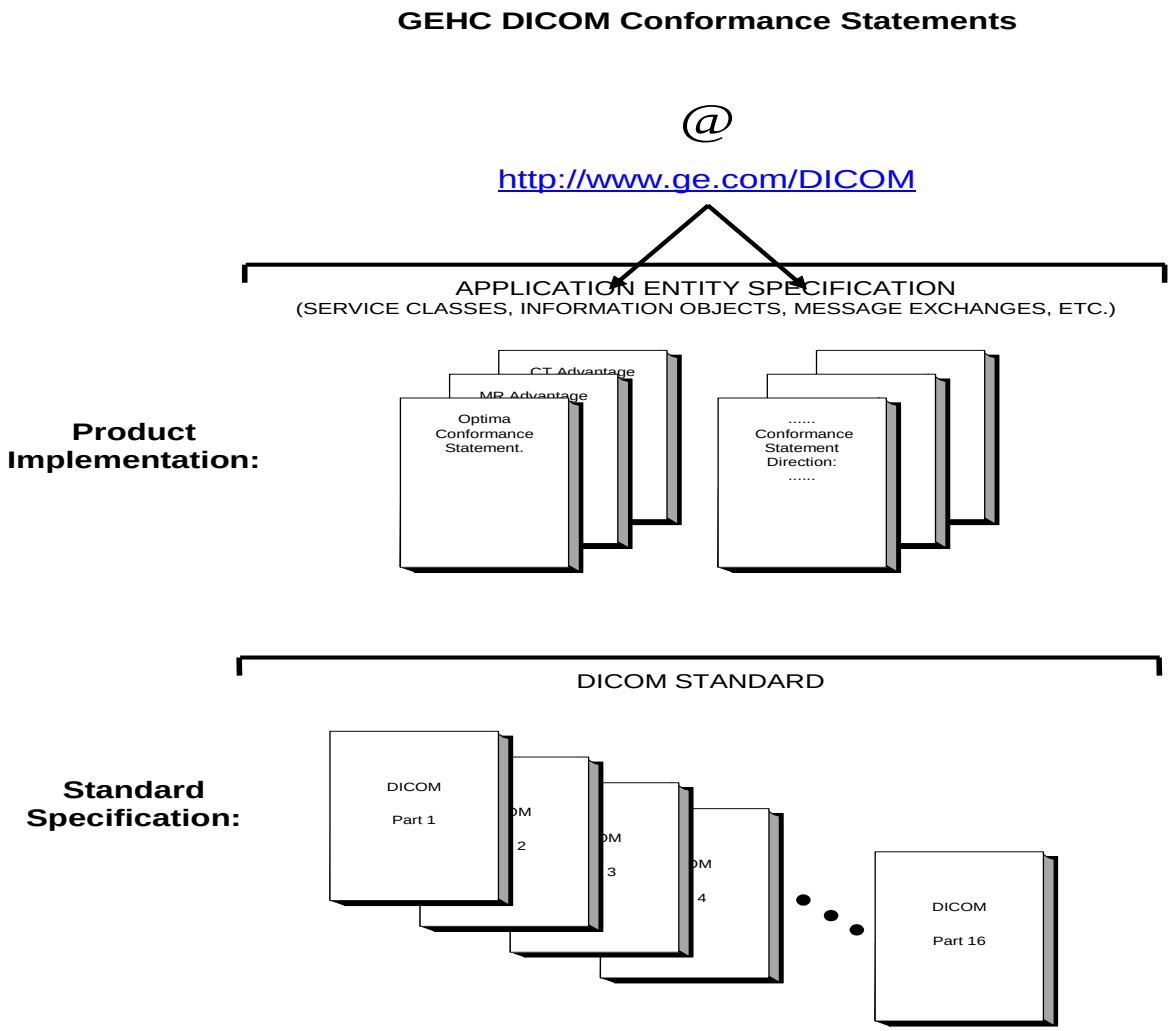


Figure 1-1 Documentation structure of GEHC conformance statements

This document specifies the DICOM implementation. It is entitled:

Definium Pace Select
Conformance Statement for DICOM

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to inter-operate with the GEHC network interface.

The GEHC Conformance Statement, contained in this document, also specifies the Lower Layer communications that it supports (for example, TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information including Network Architecture and basic DICOM concepts, Refer to the Introduction.

For more information regarding DICOM, copies of the Standard may be obtained on the Internet at http://medical.nema.org. Comments on the Standard may be addressed to:

DICOM Secretariat NEMA

1300 North 17th Street, Suite 1847

Rosslyn, VA 22209 USA

Phone: +1.703.841.3200

Intended audience

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standards and with the terrminology and concepts which are used in that standard.

If readers are unfamiliar with DICOM terminology they should first refer to the document listed below, then read the DICOM Standard itself, prior to reading this DICOM Conformance Statement document.

Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement
Direction: 2118780

1.3 Scope and field of application

It is the intent of this document, in conjunction with the Introduction to the Integrated DICOM/ Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780, to provide an unambiguous specification for GEHC implementations. This specification, called a Conformance Statement, includes a DICOM V3.0 Conformance Statement and is necessary to ensure proper processing and interpretation of GEHC medical data exchanged using DICOM V3.0. The GEHC Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GEHC devices are capable of using different Information object definitions. For example, a GEHC CT Scanner maysend images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the module definitions which define all data elements used by this GEHC implementation. If the user encounters unspecified private data elements while parsing a GEHC Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a “full fidelity storage device”, it should retain and re-transmit all the private data elements that are sent by GEHC devices.

1.4 Important remarks

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not enough to ensure that inter-operation will be successful**. The user (**or user's agent**) needs to proceed with caution and address at least four issues:

- **Integration** - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM V3.0), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non-GE systems is the user's responsibility and should not be underestimated. The user is strongly advised to ensure that such an integration analysis is correctly performed.
- **Validation** - Testing the complete range of possible interactions between any GE device and non-GE devices, before the connection is declared operational, should not be overlooked. Therefore, the user

should ensure that any non-GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non-GE device and the stability of the image data for the intended applications.

Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment are processed/displayed on a GE console or workstation.

- **Future Evolution** - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEHC protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices that have implemented DICOM. In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) reflected on by these DICOM Conformance Statements. The user should ensure that any non-GE provider, which connects with GE devices, also plans evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.
- **Interaction** - It is the sole responsibility of the non-GE provider to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1.5 References

A list of references that is applicable to all GEHC Conformance Statements is included in the Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.

The information object implementation refers to DICOM PS 3.3 (Information object definition).

1.6 Definitions

A set of definitions which is applicable to all GEHC Conformance Statements is included in the Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.

1.7 Symbols and abbreviations

A list of symbols and abbreviations which is applicable to all GEHC Conformance Statements is included in the Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.

Chapter 2 Network conformance statement

2.1 Introduction

This section of the DICOM Conformance Statement specifies the compliance to DICOM conformance requirements for the relevant Networking features on this GEHC product. Note that the format of this section strictly follows the format defined in DICOM Standard PS 3.2 (Conformance). Refer to that part of the standard while reading this section.

The details of the DICOM conformance related to other information objects and information models supported by this product are included in subsequent sections of this DICOM Conformance Statement.

The Definium Pace Select is an Integrated Digital X-ray Imaging System:

- It uses DICOM services to export images to remote workstations.
- It uses DICOM Storage Commitment service to transfer ownership of images to a remote workstation supporting storage commitment such as an archive system.
- It allows a user to query for and display DICOM modality worklist information from a remote hospital or radiology department information system computer and send back MPPS to the remote hospital information system. For example, a user may wish to query for all procedures scheduled to be performed on the system. In this situation, the Definium Pace Select is providing the DICOM Modality Worklist SOP class service as a service class user (SCU).

2.2 Implementation model

2.2.1 Application data flow diagram

The Basic and Specific Application models for this device are shown in Figure 2-1:

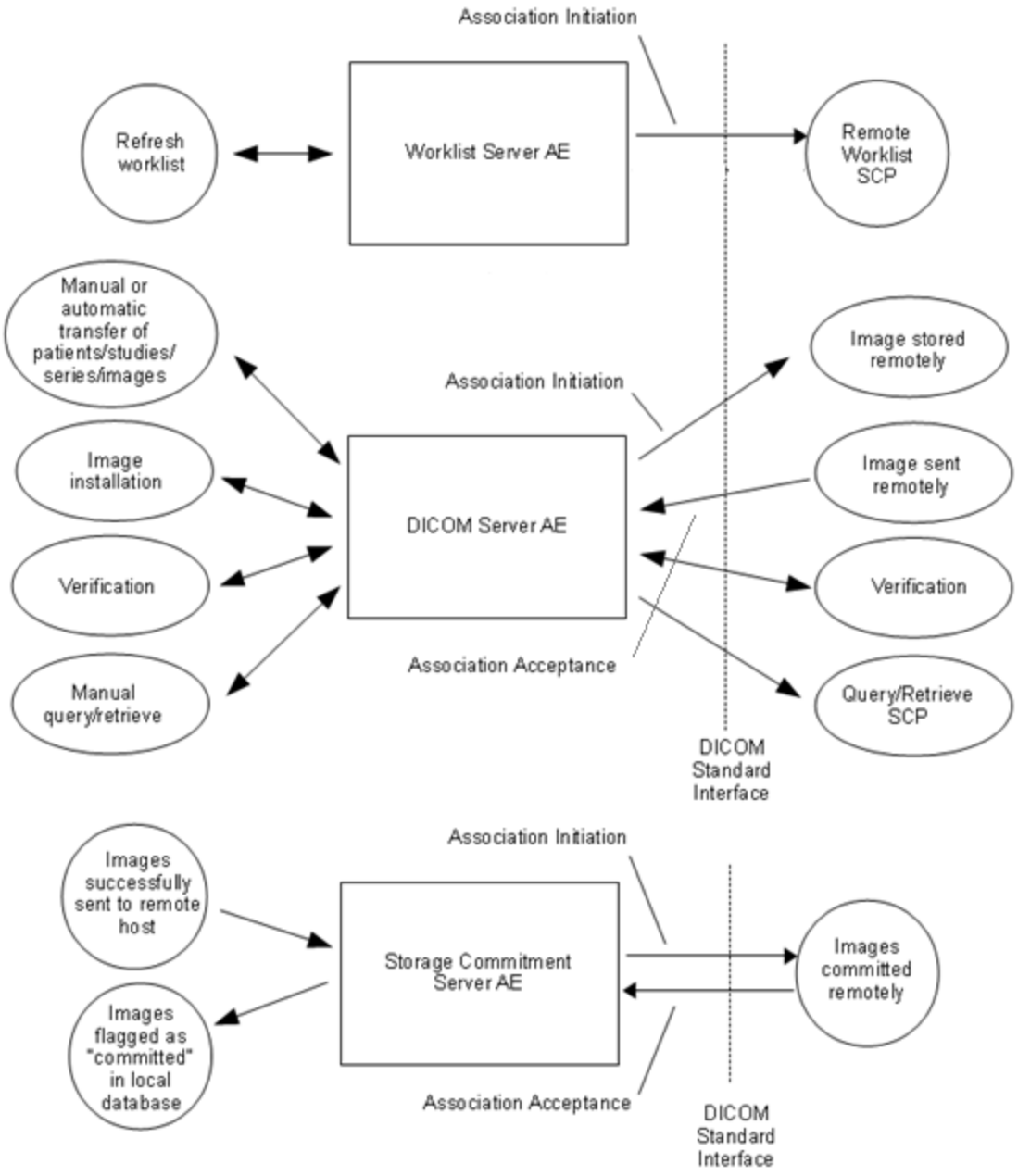


Figure 2-1 Basic and specific application models for this device

Note: Refer also to Chapter 3 Media Storage conformance statement and Chapter 7 Print Management SOP Class Definition of the current document for Media Storage and Network Print Management SCU Conformance Statement.

The DICOM 'Performed Procedure Step' Service is provided by the PPS Server AE. The PPS Server AE is commanded to perform Performed Procedure Step Services either automatically or through the User Interface.

The basic application models for the feature are shown in Figure 2-2:

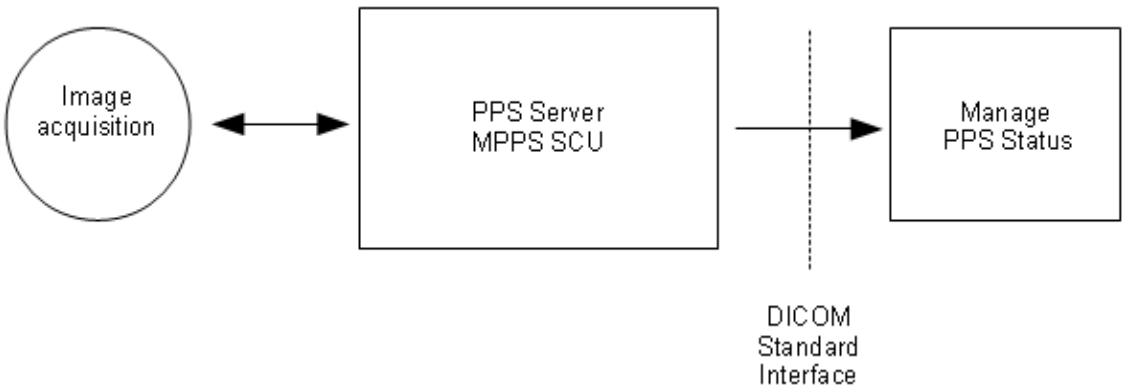
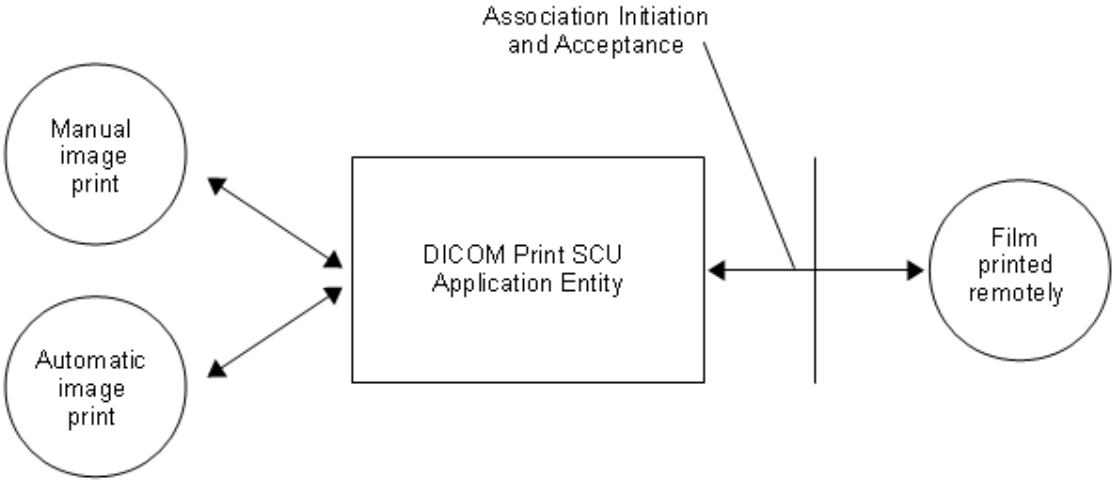


Figure 2-2 Basic application models for the feature

The DICOM Print service is provided by Print Server AE. The Definium Pace Select system can compose films through the use of an application known as PRINT MANAGER. The Definium Pace Select system uses DICOM Print Management Service Class to send images to hard copy printers. The films can then be used for possible further analysis. The Basic and Specific Application models for this device are shown in the following figure.



2.2.2 Functional AE definition

DICOM SERVER AE:

The DICOM SERVER Application Entity (AE) is an application that handles DICOM protocol communication. DICOM SERVER AE is automatically brought up when the Definium Pace Select system is powered on.

The DICOM SERVER AE is invoked by the following real-world activities:

- Manual Transfer of Patients/Studies/Series/Images from Definium Pace Select to Remote Host.

For this operation, the operator selects patients, studies, series or images on the console browser and then sends the selected patients, studies, series or images on to one or several remote DICOM AE by selecting the icon that represents the wanted remote DICOM AE.

All remote DICOM AE must be manually configured on the Definium Pace Select system by an operator or by a field engineer.

The declaration of remote DICOM AE is done through Utilities > NETWORK CONNECTIONS.

- Automatic transfer of Images from the Definium Pace Select system to a Remote Host.

For this operation, the transfer of images is triggered automatically. When Auto-Push is ON and Auto Tag is ON, all images generated during an acquisition session are automatically sent to the defined auto-push remote hosts when the user closes the exam. Only images that satisfy Quality-Check criteria are auto-pushed.

The default value of the Quality-Check is set by the user through the Utilities > Preferences > Image Management.

The setting of Auto-Push status (ON/OFF) and Auto-Push remote host is done through the Utilities

> Preferences > Image Management.

The visualization of the transfer status is done on the Transfer Log window.

Dicom Server also supports activities described below.

1) Verification
2) Query/Retrieve

VERIFICATION:

Verification calls for the verification via C-ECHO.

QUERY RETRIEVE:

DICOM server AE sends the C-FIND request to the remote AE.

To enable this operation on the Definium Pace Select system, the operator selects the host from the Network host list and selects the allow this network to query and allow network host to retrieve under preference.

Systems allows to query for the studies, series and image level on the remote AE using C-FIND message and system displays the matching studies.

System provides the flexibility to retrieve studies from remote AE sing C-MOVE message. On receiving installs the studies on local database.

WORKLIST SERVER AE:

The WORKLIST SERVER AE is automatically brought up when the system is powered on.

The remote Worklist SCP must be manually configured on the Definium Pace Select system. The configuration of remote Worklist SCP is done through the Utilities > NETWORK CONNECTIONS.

The WORKLIST SERVER AE is invoked by the real-world activity Refresh Worklist.

For this operation, the user selects the REFRESH WORKLIST button of the Worklist screen to obtain latest modality worklist from the RIS. The WORKLIST SERVER sends a query defined by the user to remote AEs and returns the results to the user interface.

The WORKLIST SERVER AE initiates the following functions:

- Build the Worklist query according to the criteria defined by the user in the Worklist Default Query Window or Query Filter List.
- Send the query to Worklist Provider: Initiates a DICOM association with the Worklist Provider. If the remote Worklist Provider accepts a presentation context applicable to modality worklist, the WORKLIST SERVER AE issues a modality worklist query request via the C-FIND service.

STORAGE COMMITMENT SERVER AE:

The STORAGE COMMITMENT SERVER AE is automatically brought up when the Definium Pace Select system is powered on.

To enable this operation on the on the Definium Pace Select system, the operator selects the host from the Network Host list and selects the Storage Commitment option. The host information has also to be filled out.

The STORAGE COMMITMENT SERVER AE is invoked by the real-world activity Images Successfully Sent to a Remote Host Supporting Storage Commitment.

The declaration of remote host supporting Storage Commitment is done on the NETWORK CONNECTIONS options.

When STORAGE COMMITMENT SERVER AE receives a successful commitment for images, it flags them as "Committed" in the local database.

The STORAGE COMMITMENT SERVER AE initiates the following operations:

- Initiate a DICOM association to ask a remote host (Storage Commitment SCP) storage commitment on specific images.

The STORAGE COMMITMENT SERVER AE waits for association requests from Remote Storage Commitment AE:

- Answer to DICOM associations transmitting Storage Commitment Notification (N-EVENT- REPORT)

PPS SERVER AE:

1. The PPS Server AE is implemented as an application process on the Acquisition host computer. It runs as a daemon serving requests from other applications to send the PPS information to the remote AE.

   To enable this operation on the Definium Pace Select, the operator selects the remote Worklist SCP from the Host list and enables MPPS option from the preferences.

2. The PPS Server AE initiates the following functions:

   - Start PPS
   - Complete PPS
   - Discontinue PPS

3. Start PPS: Initiates a DICOM association in order to create a DICOM Modality Performed Procedure Step SOP instance in the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the PPS Server AE will issue a request to create the SOP instance in the remote AE via the N-CREATE Service.

4. Complete PPS: Initiates a DICOM association in order to update a DICOM Modality Performed Procedure Step instance that is already created with the remote AE. If the remote AE accepts a presentation context applicable to Modality Performed Procedure Step, the PPS Server AE will issue a request to update the SOP instance in the remote AE via the N-SET service. The PPS Status is set to 'COMPLETED'.

5. Discontinue PPS: Initiates DICOM associations in order to update a DICOM Modality Performed Procedure Step instance that is already created with the remote AE. If the remote AE accepts a presentation context applicable to Modality Performed Procedure Step, the PPS Server AE will issue a request to update the SOP instance in the remote AE via the N-SET service. The PPS Status is set to 'DISCONTINUED'.

PRINT SERVER AE: The DICOM Print SCU Application Entity (AE) is an application that handles DICOM protocol communication with Remote DICOM Printers. The DICOM Print SCU AE is activated when the user requests for a print or when automatic print is triggered at close exam time.

2.2.3 Sequencing of real-world activities

DICOM SERVER AE:

In case of automatic transfer of images to a remote host:

1. User set Auto-Push ON and defines auto-push remote hosts.
2. User starts an exam.
3. User acquires images.
4. User checks quality of each image and sets the QC flag for each image to “OK to send” or “Not OK to send”. The default flag setting is configured through Utilities > Preferences > Image Management > Auto Tag.
5. User selects CLOSE EXAM.
6. Images flagged as “OK to send” are sent to auto-push remote hosts.

WORKLIST SERVER AE:

The user will usually refresh the Worklist before the image acquisition to get the very latest information from the RIS.

1. Upon user request, the system initiates a modality worklist query (as a modality worklist SCU) to the modality worklist SCP with a given set of query parameters.
2. The modality worklist SCP returns responses that match the query parameters.
3. Items from the returned worklist responses are filtered according to the query parameters
4. Only the items matching the query parameters are presented to the user.
5. Each item of the returned worklist responses selected for image acquisition is included in acquired DICOM images related to the responses.

STORAGE COMMITMENT SERVER AE:

1. The user selects the images and sends them to a remote host.
2. If the remote host was declared on the system as Storage Commitment Provider and if the images are successfully sent, then N-ACTION-RQ request is sent to Storage Commitment Provider.
3. Waits for N-ACTION-RSP from Storage Commitment Provider.
4. On reception of failure in N-ACTION-RSP, Storage Commitment AE logs the error, displays a pop-up and stops.
5. On reception of success, Storage Commitment AE is ready to receive at any time from Storage Commitment Provider the N-EVENT-REPORT-RQ notification.
6. On reception of N-EVENT-REPORT-RQ notification from Storage Commitment Provider, system flags the images in the database as committed.
7. When all images are flagged, Storage Commitment AE sends a N-EVENTREPORT-RSP to the Storage Commitment Provider.

PPS SERVER AE:

1. The user selects a Modality Worklist entry on the Worklist Browser.
2. User enters the ‘Acquire Mode’ by selecting ‘Start Exam’ and selecting the desired protocols.
3. If the PPS Server is configured on the system and is active, a PPS N-CREATE is issued on ‘Start Exam’.
4. The MPPS Final N-SET for ‘Complete’ or ‘Discontinued’ shall be issued on Close Exam.
5. The MPPS N-SET for Completed or Discontinued includes the complete list of images created and the Radiation Dose information.

PRINT SERVER AE:

The DICOM Print SCU AE is invoked by the following real-world activity:

Manual Image Print:

1. The user selects the remote DICOM Printer from the Print Manager GUI.
2. The user selects an image in the VIEWER, then prints the image using the "Simple print" function.
3. The PRINT MANAGER receives the "Simple print" request, composes a film then activates the DICOM Print SCU AE that initiates the following actions.
4. Initiates a DICOM association and selects a Presentation Context.
5. N-GETs printer status from the Printer SOP Instance if printer Status is FAILURE, Signal print failure to the user Association is aborted; else if Printer Status is WARNING and Printer Status Info is not equal to SUPPLY LOW or SUPPLY EMPTY, Signal print warning to the user Association si released.
6. N-CREATEs a Basic Film Session SOP Instance.
7. N-CREATEs a Basic Film Box SOP Instance for the current film.
8. N-SETs the Basic Film Box SOP Instance with the Image Box SOP Instance for each image on the film.
9. N-ACTIONs on the Basic Film Box SOP Instance.
10. N-DELETEs on the Basic Film Box SOP Instance.

Auto Print:

Same as Manual Print except step 1 and 2 to be replaced by:

1. User sets Auto-Print ON, defines auto-print parameters, and configures the Quality Check default to "OK to print" or "Not OK to print" from Medical Applications Preferences.
2. User starts an exam and acquires images.
3. User sets the Quality Check flag to "OK to print" or "Not OK to print".
4. User selects CLOSE EXAM.
5. All images with the Quality Check flag set to "OK to print" are automatically printed.

2.3 AE specifications

2.3.1 DICOM server AE specification

This Application Entity provides Standard Conformance to the following DICOM SOP classes as a SCU:

Table 2-1

SOP class name	SOP class UID
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2
Verification SOP class	1.2.840.10008.1.1
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

Note: MWL & MPPS are described in section 2.3.2 & 2.3.4 respectively.

This Application Entity provides Standard Conformance to the following DICOM SOP classes as a SCP:

Table 2-2

SOP class name	SOP class UID
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Verification SOP class	1.2.840.10008.1.1
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

2.3.1.1 Association establishment policies

General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The Maximum Length PDU negotiation is included in all association establishment requests. The maximum length PDU for an association initiated by the DICOM SERVER AE is:

Maximum Length PDU	28 Kbytes

The SOP class Extended negotiation is not supported.

The maximum number of Presentation Context Items that will be proposed is 18. The user information Items sent by this product are:

- Maximum PDU Length
- Implementation UID

Number of associations

The DICOM SERVER AE will initiate up to two DICOM associations at a time to perform a DICOM store operation as a SCU to a Remote Host AE.

The DICOM SERVER AE can have any number of open DICOM associations at a time to perform a DICOM store operation as a SCP or respond to an echo.

The DICOM SERVER AE will initiate up to 3 DICOM associations at a time to perform a Query/ Retrieve with a Remote Host AE.

Asynchronous nature

Asynchronous mode is not supported. All operations will be performed synchronously.

Implementation identifying information

The implementation UID for this DICOM implementation is:

System implementation UID for Definium Pace Select	1.2.840.113619.6.502
System implementation version name	Values*

Association initiation by real-world activity

Real-world activity: Verification

The operator must select a network destination in the Utility User Interface and press the “C-Echo Test” button. These operations will cause:

- The system DICOM Application Entity to initiate a DICOM association
- The system DICOM Application Entity to emit a C–ECHO command to check if the remote AE is available.

Proposed presentation context table

Table 2-3 Presentation context table – proposed

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	**UID**	**Name list**	**UID list**		
Verification	1.2.840.10008.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Verification	1.2.840.10008.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

Real-world activity: Manual transfer of patients/studies/series/images

Associated real-world activity

The operator does the following:

- Select in the BROWSER one or several Patient Folders (or Studies/Series/Images) to be sent. Then select the Remote DICOM AE displayed as an icon among the configured destination nodes.

This operation will cause:

- The Definium Pace Select system to retrieve the selected images from its local database.
- The DICOM SERVER AE to initiate a DICOM association, negotiate with the Remote AE an appropriate Abstract and Transfer syntax.
- To emit C-STORE command to send the images, if the negotiation is successful.

Proposed presentation context table

Table 2-4 Presentation context table – proposed

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	**UID**	**Name list**	**UID list**		
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	**UID**	**Name list**	**UID list**		
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

Common SOP specific DICOM conformance statement for all storage SOP classes

Following are the Status codes that are more specifically processed when receiving messages from a Storage SCP equipment:

Table 2-5

Service Status	Status codes	Further meaning	Application behavior when receiving status codes	Related Fields Processed if received
Refused	A7xx	Out of resources	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)

Service Status	Status codes	Further meaning	Application behavior when receiving status codes	Related Fields Processed if received
	0122	SOP class not Supported	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)
Error	Cxxx	Cannot Understand	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	A9xx	Data Set does not match SOP class	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
Warning	B000	Coercion of Data Elements	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	B007	Data Set does not match SOP class	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	B006	Elements Discarded	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
Success	0000			None

SOP specific DICOM conformance statement for Digital X-Ray Storage SOP classes

As described earlier, when the operator selects one or several images to be sent to a remote host, the DICOM SERVER AE initiates a DICOM association and negotiates with the Remote AE an appropriate Abstract and Transfer syntax.

If the images to be sent are Digital X-Ray for Processing Image, the Remote AE has to accept one of the following proposed presentation contexts:

Table 2-6 *Presentation context table – proposed*

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	UID	Name list	UID list		
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 2-7 *Presentation context table – proposed*

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	UID	Name list	UID list		
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

If the images to be sent are Digital X-Ray for Presentation Image, the Remote AE has to accept one of the following proposed presentation contexts:

Table 2-8 Presentation context table – proposed

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	UID	Name list	UID list		
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

If the Remote AE does not accept any of the above Proposed Presentation Context according to the image type but accepts one of the Presentation Context of the table below, then the image of type Digital X-Ray (DX) For Processing or For Presentation will be fallback into an image of type Computed Radiography (CR) before being sent to the Remote AE.

Table 2-9 Presentation context table

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	UID	Name list	UID list		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

After fallback from DX to CR, the produced image will contain the attributes defined in the DICOM standard for CR SOP and all attributes that can be found in the original image as the extended IOD for CR is supported.

The modules that are specific to a CR image (CR Series and CR Image module) will be filled and some of the modules that are common to both IODs (Patient, General Study, General Series, General Image, SOP Common, etc.) will be modified. Every data field added or modified is detailed:

CR Series module:

Table 2-10

Attribute name	Tag	Type	Attribute description	Conversion Rule
Body Part Examined	(0018,0015)	2	Text description of the part of the body examined	If it is not present in the original image, it will be added and set to zero length value. If it is present in original image, it will keep the same value.
Filter Type	(0018,1160)	3	Label of the type of filter inserted into the X-Ray beam	Same value as in the original image. (May be zero length or absent)

Attribute name	Tag	Type	Attribute description	Conversion Rule
Collimator/ Grid Name	(0018,1180)	3	Label describing any grid inserted	Not sent. (Never present in original image)
Focal Spot	(0018, 1190)	3	Size of the focal spot in mm. For devices with variable focal spot or multiple focal spots, small dimension followed by large dimension.	Same value as in the original image. (May be zero length or absent)
Plate Type	(0018,1260)	3	Label of the type of storage phosphor plates used in this series	Not sent. (Never present in original image)
Phosphor Type	(0018,1261)	3	Label of type of phosphor on the plates	Not sent. (Never present in original image)
View Position	(0018,5101)	2	Radiographic view associated with Patient Position (0018,5100)	If it is not present in the original image, it will be added and set to zero length value. If it is present in original image, it will keep the same value.

CR Image module:

Table 2-11

Attribute name	Tag	Type	Attribute description	Conversion Rule
KVP	(0018,0060)	3	Peak kilo voltage output of the X-ray generator used.	Same value as in the original image. (May be zero length or absent)
Plate ID	(0018,1004)	3	The ID or serial number of the sensing plate upon which the image was acquired.	Not sent. (Never present in original image)
Distance Source to Detector	(0018,1110)	3	Distance in mm from source to detector center.	Same value as in the original image. (May be zero length or absent)
Distance Source to Patient	(0018,1111)	3	Distance in mm from source to tabletop.	Same value as in the original image. (May be zero length or absent)
Exposure Time	(0018,1150)	3	Time of X-ray exposure in mSec	Same value as in the original image. (May be zero length or absent)
X-Ray Tube Current	(0018,1151)	3	X-ray tube current in mA	Same value as in the original image. (May be zero length or absent)
Exposure	(0018,1152)	3	The product of exposure time and X-ray tube current expressed in mAs	Same value as in the original image. (May be zero length or absent)
Exposure in µAs	(0018,1153)	3	The product of exposure time and X-ray tube current expresses in µAs	Same value as in the original image. (May be zero length or absent)

Attribute name	Tag	Type	Attribute description	Conversion Rule
Imager Pixel Spacing	(0018,1164)	3	Physical distance measured at the front plane of the detector housing between the center of each image pixel specified by a numeric pair - row spacing value (delimiter) column spacing value in mm.	Same value as in the original image. (May be zero length or absent).
Generator Power	(0018,1170)	3	Power in kW to the X-ray generator	Not sent. (Never present in original image)
Acquisition Device Processing Description	(0018,1400)	3	Describe device-specific processing associated with the image	Same value as in the original image. (May be zero length or absent)
Acquisition Device Processing Code	(0018,1401)	3	Code representing the device-specific processing associated with the image.	Same value as in the original image. (May be zero length or absent)
Cassette Orientation	(0018,1402)	3	Orientation of Cassette.	Not sent. (Never present in original image)
Cassette Size	(0018,1403)	3	Size of Cassette.	Not sent. (Never present in original image)
Exposures on Plate	(0018,1404)	3	Total Number of X-ray exposures that have been made on the plate identified in Plate ID (0018,1004)	Not sent. (Never present in original image)
Relative X- Ray Exposure	(0018,1405)	3	Relative X-ray exposure on the plate. Meaning of values is implementation specific.	Same value as in the original image. (May be zero length or absent)
Exposure Index	(0018,1411)	3	Measure of the detector response to radiation in the relevant image region of an image acquired with a digital x-ray imaging system as defined in IEC 62494-1.	Same value as in the original image. (May be zero length or absent)
Target Exposure Index	(0018,1412)	3	The target value used to calculate the Deviation Index (0018,1413) as defined in IEC 62494-1.	Same value as in the original image. (May be zero length or absent)
Deviation Index	(0018,1413)	3	A scaled representation of the difference of the Exposure Index compared to the Target Exposure Index.	Same value as in the original image. (May be zero length or absent)
Sensitivity	(0018,6000)	3	Read out sensitivity	Same value as in the original image. (May be zero length or absent)

General Patient module:

The attributes of the General Patient module are equal to the section 4.6.1.1 patient module of DX instance.

General Study module:

The attributes of the General Study module will be equal to those in the original image, including:

- Study Instance UID (0020,000D)
- Study ID (0020,0010).

General Series module:

The attributes of the General Series module will be equal to those in the original image, except:

Modality (0008,0060): Set to CR.

Series Instance UID (0020,000E): A new UID should be created, because DICOM series can only contain objects with the same modality.

Laterality (0020, 0060): Set value according to Image Laterality (0020,0062) of the original image:

- L in Image Laterality (0020,0062) => L in Laterality (0020, 0060)
- R in image Laterality (0020,0062) => R in Laterality (0020, 0060)
- U or B in Image Laterality (0020,0062) => Laterality (0020,0060) is absent.

General Equipment module:

The attributes of the General Equipment module will be equal to those in the original image.

General Image module:

The attributes of the General Image module will be equal to those in the original image except:

Image Type (0008,0008): The two first values of this multi-values attribute will always be ORIGINAL (pixel values are based on original data) and SECONDARY (image created after the initial patient examination). The third and later values are provided if present in the original image.

Derivation Description (0008,2111): this attribute will be created and will contain CR Fallback.

Ref Image Sequence (0008,2112): This sequence will be in the General Image module. It will be composed of one item containing the SOP class and SOP Instance UIDs of the original image.

Image Pixel module:

The attributes of the Image Pixel module will be equal to those in the original image.

SOP Common module:

Table 2-12

Attribute name	Tag	Type	Attribute description	Conversion Rule
Specific Character Set	(0008,0005)	1	Character Set that expands or replace the Basic Graphic Set.	Same value as in the original image. (ISO IR_100 by default)
Instance Creation Date	(0008,0012)	3	Date the SOP Instance was created	Not sent. (Never present in original image)
Instance Creation Time	(0008,0013)	3	Time the SOP Instance was created	Not sent. (Never present in original image)
Instance Creator UID	(0008,0014)	3	Uniquely identifies the device which created the SOP Instance	Not sent. (Never present in original image)

Attribute name	Tag	Type	Attribute description	Conversion Rule
SOP Class UID	(0008,0016)	1	Uniquely identified the SOP class	Set to 1.2.840.10008.5.1.4.1.1.1
SOP Instance UID	(0008,0018)	1	Uniquely identified the SOP Instance	New UID is generated

Real-world activity: Automatic transfer of patients/studies/series/images

Associated real-world activity

The operator does the following:

- Set Auto-Push ON, select Auto-Push remote hosts, and set the default setting for Quality Check ("OK to send" or "Not OK to send").
- Start an exam, acquire images.
- Set the Quality Check flag as desired for each image. ("OK to send" or "Not OK to send").
- Close the exam.

This operation will cause:

- The DICOM SERVER AE to initiate a DICOM association, negotiate with the Remote AE an appropriate Abstract and Transfer syntax.
- To emit C-STORE command to send the "OK to send" images, if the negotiation is successful.

Proposed presentation context table

Same as real-world activity Manual Transfer of Patients/Studies/Series/Images.

Common SOP specific DICOM conformance statement for all storage SOP classes

Same as real-world activity Manual Transfer of Patients/Studies/Series/Images.

SOP Specific DICOM conformance statement for digital x-ray storage SOP classes

Same as real-world activity Manual Transfer of Patients/Studies/Series/Images.

Real-world activity: Query / Retrieve

The operator does the following:

- Go to Browser and select the Remote DICOM AE displayed as an icon among configured source nodes.

This operation will cause:

- The Definium Pace Select system to query the Remote DICOM AE at Study Level to retrieve all the relevant studies. While selecting series in the Browser, Series level and image level query are initiated.
- Select one or several Patient Folders (or Studies/Series/Images) to be retrieved in the Browser. Then select the Local DB displayed as an icon among the configured destination nodes.

This operation will cause:

- The Definium Pace Select system to retrieve the selected studies to local database.
- The Remote DICOM SERVER AE to initiate a DICOM association, negotiate with the DICOM AE an appropriate Abstract and Transfer syntax.

Proposed presentation context table

Table 2-13 Presentation context table – proposed

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	**UID**	**Name list**	**UID list**		
Study Root query/retrieve information model – Find	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Study Root query/retrieve information model – Find	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root query/retrieve information model – Find	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Study Root query/retrieve information model – Move	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Study Root query/retrieve information model – Move	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root query/retrieve information model – Move	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

SOP Specific DICOM Conformance Statement for the Patient Root Query/Retrieve Information Model - FIND, Study Root Query/Retrieve Information Model - FIND and Patient/Study Only Query/Retrieve Information Model - FIND SOP Classes

The DICOM AE of Definium Pace Select includes matching keys in the queries as described in Information model keys. Specific Character Set (0008,0005) when encoding for queries is for ISO IR_100 only. C-FIND CANCEL is not supported by the system.

Following are the status codes that are more specifically processed when receiving messages from a Query SCP equipment:

Table 2-14

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	A700	Refused: Out of resources	Association is closed with Remote AE. A message is displayed to the user. Error is logged.
	C000-CFFF	Error: Unable to process	Association is closed with Remote AE. A message is displayed to the user. Error is logged.
	0122	SOP Class Not Supported	Association is closed with Remote AE. A message is displayed to the user. Error is logged.

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Cancel	FE00	Matching terminated due to cancel	Association is closed with Remote AE. A message is displayed to the user. Error is logged.
Success	0000	Matching is complete - No final identifier is supplied	Association is closed with Remote AE. A message is displayed to the user.
Pending	FF00	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	Association is closed with Remote AE. A message is displayed to the user. Error is logged.

SOP Specific DICOM Conformance Statement for the Patient Root Query/Retrieve Information Model - MOVE, Study Root Query/Retrieve Information Model - MOVE and Patient/Study Only Query/Retrieve Information Model - MOVE SOP Classes

The C-MOVE-RQ will use the AE Title of the TERRA_NETWORK Application Entity as the Move Destination AE Title. C-MOVE CANCEL is not supported by DICOM AE.

Following are the status codes that are more specifically processed when receiving messages from a Retrieve SCP equipment:

Table 2-15

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	A701	Refused: Out of resources - Unable to calculate number of matches	Association is closed with Remote AE. A message is displayed to the user. Error is logged.
	A702	Refused: Out of resources - Unable to perform sub-operations	Association is closed with Remote AE. A message is displayed to the user. Error is logged.
	A801	Refused: Move Destination Unknown	Association is closed with Remote AE. A message is displayed to the user. Error is logged.
	A900	Error: Identifier does not match SOP Class	Association is closed with Remote AE. A message is displayed to the user. Error is logged.
	C000-CFFF	Error: Unable to process	Association is closed with Remote AE. A message is displayed to the user. Error is logged.
	0122	SOP Class Not Supported	Association is closed with Remote AE. A message is displayed to the user. Error is logged.
Warning	B000	Sub-operations Complete - One or more Failures.	Association is closed with Remote AE. A message is displayed to the user. Error is logged.
Success	0000	Sub-operations Complete - No Failure.	Association is closed with Remote AE. A message is displayed to the user.
Pending	FF00	Sub-operations are continuing -	Association is closed with Remote AE. A message is displayed to the user.

Association acceptace by real-world activity

Real-world activity: Respond to Verification

The system DICOM AE is always listening to associations. No operator action is required to respond to a Verification request from any DICOM node.

Accepted presentation context table

Table 2-16 Presentation context table – Accepted

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	UID	Name list	UID list		
Verification	1.2.840.10008.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

Real-world activity: receive images

The operator does the following:

- Add the remote network node with “Allow this network host to send image to the TERRA_NETWORK” enabled.

This operation will cause:

- The image(s) sent from remote network host will be added to Browser as new study.

Accepted presentation context table

Table 2-17 Presentation context table – accepted

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	UID	Name list	UID list		
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	**UID**	**Name list**	**UID list**		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

SOP Specific DICOM Conformance Statement for all Storage SOP Classes

The system provides Level 2 (FULL) Conformance, and stores all mandatory (Type 1, Type 2 and Type 3) data elements of received SOP Instances. It also stores selected private data elements for which it has a data dictionary entry, as described in Sections 4.3 DX IOD implementation.

The AE validates that the Attributes of the SOP Instance meet the requirements of the IOD with respect to Value Representation, presence of Type 1 and 2 elements, valid values, and consistency between image attributes and pixel data.

The AE provides Digital Signature Level 2 support, as it provides full fidelity storage of received SOP Instances.

Successfully received SOP Instances may be accessed via the user interface and by DICOM network query retrieve. SOP Instances are stored until manually deleted by the user.

Following are the status codes the Application may send back to the SCU Equipment after performing the requested Storage:

Table 2-18

Service Status	Status Code	Further Meaning	Status Code Explanation	Related Fields Sent Back to the SCU
Failure	A7xx	Refused: Out of resources	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)
	A9xx	Error: Data Set does not match SOP Class	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	0122	SOP Class Not Supported	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)

Service Status	Status Code	Further Meaning	Status Code Explanation	Related Fields Sent Back to the SCU
	B007	Data Set does not match SOP Class	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	B006	Elements Discarded	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
Success	0000			None

Real-world activity: Respond to Query / Retrieve

The operator does the following:

- Configure the DICOM node with "Allow this network host to query the TERRA_NETWORK" and "Allow this network host to retrieve the TERRA_NETWORK".

This operation will cause:

- Definium Pace Select DICOM AE is always listening to associations. No operator action is required to respond to association.

Accepted presentation context table

Table 2-19 Presentation context table – accepted

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	UID	Name list	UID list		
Study Root query/retrieve information model – Find	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Study Root query/retrieve information model – Find	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root query/retrieve information model – Find	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Study Root query/retrieve information model – Move	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Study Root query/retrieve information model – Move	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root query/retrieve information model – Move	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

SOP Specific DICOM Conformance Statement for the Patient Root Query/Retrieve Information Model - FIND, Study Root Query/Retrieve Information Model - FIND and Patient/Study Only Query/Retrieve Information Model - FIND SOP Classes

The system provides matching against query keys as described in Sections 5.4 Information model keys.

The AE supports does not support Relational Search.

The AE supports does not support case-insensitive matching for the attributes of Value Representation PN as described in Sections 5.4.1 Supported Matching.

Following are the status codes the Application may send back to the SCU Equipment while performing the requested Query:

Table 2-20

Service Status	Status Code	Further Meaning	Status Code Explanation	Related Fields Sent Back to the SCU
Failure	A700	Refused: Out of resources	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)
	A900	Error: Identifier does not match SOP Class	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	Cxxx	Error: Unable to process	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	0122	SOP Class Not Supported	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)
Success	0000	Matching is complete - No final identifier is supplied		None
Pending	FF00	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	Identifier
	FF01	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	Identifier

SOP Specific DICOM Conformance Statement for the Patient Root Query/Retrieve Information Model - MOVE, Study Root Query/Retrieve Information Model - MOVE and Patient/Study Only Query/Retrieve Information Model - MOVE SOP Classes

The DICOM AE of Definium Pace Select supports Storage Sub-operations for Instances of any of the Composite SOP Classes it supports as an SCU.

Following are the status codes the Application may send back to the SCU Equipment while performing the requested Retrieve:

Table 2-21

Service Status	Status Code	Further Meaning	Status Code Explanation	Related Fields Sent Back to the SCU
Failure	A701	Refused: Out of resources - Unable to calculate number of matches	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)
	A702	Refused: Out of resources - Unable to perform sub-operations	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,1021) (0000,1022) (0000,1023)
	A801	Error: Move Destination Unknown	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)
	A900	Error: Identifier does not match SOP Class	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	0122	SOP Class Not Supported	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)
Cancel	FE00	Sub-operations terminated due to a Cancel indication	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Warning	B000	Sub-operations Complete - One or more Failures.	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,1021) (0000,1022) (0000,1023)
Success	0000	Sub-operations Complete - No Failure.		(0000,1021) (0000,1022) (0000,1023)
Pending	FF00	Sub-operations are continuing	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

2.3.2 Worklist server AE specification

This Application Entity provides Standard Conformance to the following DICOM V3.0 SOP classes as SCU:

Table 2-22

SOP class name	SOP class UID
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31

2.3.2.1 Association establishment policies

General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The Maximum Length PDU negotiation is included in all association establishment requests. The maximum length PDU for an association initiated by the WORKLIST SERVER AE is:

Maximum Length PDU	28Kbytes

The SOP class Extended negotiation is not supported.

The maximum number of Presentation Context Items that will be proposed is 1. The user information Items sent by this product are:

- Maximum PDU Length
- Implementation UID

Number of associations

The WORKLIST SERVER AE (SCU) will initiate only one DICOM association at a time to perform a modality worklist query of a single remote AE.

Asynchronous nature

Asynchronous mode is not supported. All operations will be performed synchronously.

Implementation identifying information

The implementation UID for this DICOM implementation is:

System implementation UID for Definium Pace Select	1.2.840.113619.6.502
System implementation version name	Values*

Association initiation by real-world activity

Real-world activity: Worklist query

Associated real-world activity

The operator of the system initiates a query for a modality worklist by pressing the “Refresh Worklist” button in Worklist screen. The Worklist Server will then initiate an association with the remote AE in order to query for the worklist A user can configure a number of parameters that directly control the worklist query request. The user can request worklist items that are intended for the system the user is working at, all items that apply to the modality of the system the user is working at or all worklist items available. These selections and their effects on worklist query parameters are given below:

This system:

- Modality, (0008,0060) - set to empty.
- Scheduled Station AE Title, (0040,0001) - set to Query AE title

DX modality:

- Modality, (0008,0060) - set to DX
- Scheduled Station AE Title, (0040,0001) - zero-length (universal matching)

CR modality:

- Modality, (0008,0060) - set to CR
- Scheduled Station AE Title, (0040,0001) - zero-length (universal matching)

All systems:

- Modality, (0008,0060) - zero-length (universal matching)
- Scheduled Station AE Title, (0040,0001) - zero-length (universal matching)

The scheduled dates of procedures of interest can be specified for query by selecting a specific date range. The date ranges available are Today or between two given dates. These selections and their affects on worklist query parameters are given below:

Today:

Scheduled Procedure Step Start Date, (0040,0002) - set to YYYYMMDDYYYYMMDD, where YYYYMMDD is the current date.

Between 2 dates:

Scheduled Procedure Step Start Date, (0040,0002) - set to YYYYMMDDYYYYMMDD’, where YYYYMMDD is set to given “From Date” and YYYYMMDD’ is set to given “To Date”.

Patient name:

Patient Name, (0010,0010) - set to given Patient Name

Patient ID:

Patient ID, (0010,0020) - set to given Patient ID

Proposed presentation context table

The following table shows the proposed presentation contexts for the Worklist Server AE after real-world activity "Worklist Query" has been initiated:

Table 2-23 *Presentation context table - proposed*

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	**UID**	**Name list**	**UID list**		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

SOP Specific DICOM conformance statement for the Worklist SOP class

Following are the Status codes that are more specifically processed when DICOM AE of Definium Pace Select SCU receiving messages from a Modality Worklist SCP:

Table 2-24

Service Status	Status Code	Further Meaning	Status Code Explanation	Related Fields Sent Back to the SCU
Failure	A700	Refused: Out of resources	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0902)
	A900	Error: Identifier does not match SOP Class	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
	Cxxx	Error: Unable to process	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	(0000,0901) (0000,0902)
Cancel	FE00	Matching terminated due to Cancel request	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	None
Success	0000	Matching is complete - No final identifier is supplied		None
Pending	FF00	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	Identifier
	FF01	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier.	Association is closed with Remote AE. A message is displayed to the user. Error is logged.	Identifier

If the remote AE does not support the proposed Presentation Context, an appropriate error is logged, and the operator is notified.

This implementation can receive multiple C-FIND results over a single association. Only one association is opened at a time.

Each C-FIND response received from the remote AE is parsed to verify the length/type of the items in the response. Upon detecting any error in the response data, the Worklist Server AE will ignore the bad data and carry on to the next C-FIND response.

On receipt of any error from the remote AE, the Worklist Server will issue a C-FIND-CANCEL and, upon receipt of a C-FIND-RSP (or if an applicable timer expires), will close the association.

Warnings received from the remote AE are ignored.

Each C-FIND operation supports an "Association Timer." This timer starts when the association request is sent or received and stops when the association is established. The default time-out value is 15 seconds.

If the above timer expires, the association is aborted (A-ABORT) and the operation in progress is considered to have failed. Any previously received worklist items are kept.

Record acceptance policy

All worklist items coming from the remote AE are accepted. Nevertheless, the system filters each received worklist item checking that it matches the query parameters. If the received worklist item matches the query parameter, then it is stored in the local Worklist database and displayed to the user, else it is ignored.

The filter checks the following fields:

Table 2-25

Tag value	Worklist attribute	Acceptance
(0008,0005)	Specific Character Set	Check that value is empty or equal to one listed in section 2.7
(0008,0060)	Modality	Check that value is empty or equal to DX
(0010,0010)	Patient Name	If value defined in Query Definition Window, check that value matches the defined value
(0010,0020)	Patient ID	If value defined in Query Definition Window, check that value matches the defined value
(0040,0001)	Scheduled Station AE Title	If matching is defined in the query parameters, then check that value is empty or equal to the defined value in query parameters setting.
(0040,0002)	Scheduled Procedure Step Start Date	If matching is defined in the query parameters, then check that value is empty or equal to the defined value in query parameters setting.

2.3.2.2 Association acceptance policy

The Worklist Server AE does not respond to attempts by a remote AE to open an association.

2.3.3 Storage commitment server AE specification

This Application Entity provides Standard Conformance to the following DICOM SOP classes as an SCU:

Table 2-26

SOP class name	SOP class UID
Storage Commitment Push Model	1.2.840.10008.1.20.1

2.3.3.1 Association establishment policies

General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The Maximum Length PDU negotiation is included in all association establishment requests. The maximum length PDU for an association initiated by the STORAGE COMMITMENT SERVER AE is:

Maximum Length PDU	28Kbytes

The SOP class Extended negotiation is not supported.

The maximum number of Presentation Context Items that will be proposed is 1. The user information Items sent by this product are:

- Maximum PDU Length
- Implementation UID

Number of associations

The STORAGE COMMITMENT SERVER AE will initiate only one DICOM association at a time to perform a DICOM storage commitment operation as a SCU to a Remote Host AE.

Asynchronous nature

Asynchronous mode is not supported. All operations will be performed synchronously.

Implementation identifying information

The implementation UID for this DICOM implementation is:

Table 2-27

System implementation UID for Definium Pace Select	1.2.840.113619.6.502
System implementation version name	Values*

Association initiation by real-world activity

Real-world activity: Images successfully sent to a remote host declared as a Storage Commitment Provider

Associated real-world activity

The user can configure a Remote Host as a Storage Commitment Provider on the Definium Pacs Select system.

The operator selects in the BROWSER one or several Patient Folders (or Studies/Series/Images) to be sent. Then, the user can select the icon representing the Remote DICOM AE. The selected Remote DICOM AE must be declared as a Storage Commitment Provider.

This operation will cause:

- The Definium Pacs Select system to retrieve the selected image from its local database.
- The DICOM SERVER AE to initiate a DICOM association, negotiate with the Remote AE an appropriate Abstract and Transfer syntax.
- To emit C-STORE command to send the image, if the negotiation is successful.
- When all images have been successfully sent, the DICOM SERVER AE asks the STORAGE COMMITMENT SERVER AE to commit the images.

- The STORAGE COMMITMENT SERVER AE initiates a DICOM association, negotiate with the Remote AE an appropriate Abstract and Transfer syntax.
- If the negotiation is successful, STORAGE COMMITMENT SERVER AE emits a N-ACTION request. Only one N-ACTION Request is sent for all images to be committed.

Note: Storage Commitment is never requested for images sent to remote host with CR Fallback (see section SOP specific DICOM conformance statement for Digital X-Ray Storage SOP classes).

Proposed presentation context table

Table 2-28 *Presentation context table - proposed*

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	**UID**	**Name list**	**UID list**		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

SOP Specific DICOM conformance statement for the Storage Commitment Push Model SOP class

If the association negotiation is not successful the STORAGE COMMITMENT SERVER AE retries the association negotiation, and if association negotiation still fails, an error file is logged, and the Storage Commitment is abandoned.

After the N-ACTION request, if the received N-ACTION Response from the Storage Commitment Provider has a failure status, an error file is logged, the Storage Commitment is abandoned, and a pop-up is displayed to the user.

After the N-ACTION request, if the received N-ACTION Response from the Storage Commitment Provider has a success status, the STORAGE COMMIMTMENT SERVER AE can receive the N- EVENT-REPORT from the Storage Commitment Provider at any time (see 2.3.3.1.6.1 Real-world activity: Image remotely committed) There is no time out to limit the period of time between the reception of the N-ACTION Response and the reception of the NEVENT-REPORT from the Storage Commitment Provider.

Association acceptance policy

The STORAGE COMMITMENT SERVER AE accepts an association for Storage Commitment notification (N-EVENT-REPORT) only as a SCU. The Storage Commitment Provider initiating the association must use the role selection negotiation.

Real-world activity: Image remotely committed

The STORAGE COMMITMENT SERVER AE accepts an association when it receives a valid association request from a STORAGE COMMITMENT Provider.

Associated real-world activity

The STORAGE COMMITMENT SERVER AE waits for any association. No operator action is required to receive a storage commitment notification.

Accepted presentation context table

Table 2-29 Presentation context table - accepted

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	**UID**	**Name list**	**UID list**		
Storage Commitment Push	1.2.840.10008.1.20.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Storage Commitment Push	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Storage Commitment Push	1.2.840.10008.1.20.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

Note: The Storage Commitment Provider initiating the association must use the role selection negotiation.

SOP specific DICOM conformance statement for Storage Commitment SOP Class

Following are the Status codes the Application may send back to the SCP Equipment after receiving the N-EVENT-REPORT:

Service status	Status codes	Further meaning	Status Code sending explanation	Related Fields sent back to SCP
Error	0110	Processing Failure	Indicates that an internal system call has failed while processing	None
Success	0000			None

Storage Commitment Notification notifies the STORAGE COMMITMENT SERVER AE if the Storage Commitment Provider has successfully committed the images or not.

If an image has been successfully committed, the STORAGE COMMITMENT SERVER AE asks the local database to flag the image as “Committed”.

If an image has NOT been committed, the STORAGE COMMITMENT SERVER AE logs the error file and displays a pop-up to the user.

If the STORAGE COMMITMENT SERVER AE has successfully processed the notification as described above, Success is sent back to the Storage Commitment Provider.

If the STORAGE COMMITMENT SERVER AE failed to process the notification as described above, Error is sent back to the Storage Commitment Provider.

Presentation context acceptance criterion

The Storage Commitment Provider initiating the association must use the role selection negotiation.

Transfer syntax selection policies

Explicit Little Endian Transfer syntax is chosen first, then the Implicit Little Endian and then the Explicit Big Endian.

2.3.4 PPS server AE specification

2.3.4.1 Performed Procedure Step

Associated real-world activity

The real-world activities are mentioned in 2.2.3 Sequencing of real-world activities. Each real-world activity results in either creating a new Performed Procedure Step SOP instance at the remote SCP or updating an already created Performed Procedure SOP instance as per the DICOM standard.

N-CREATE and N-SET request message

PPS Feature attribute list supported for this product is listed in Chapter 9 Modality Performed Procedure Step Implementation. This feature also supports the attributes listed in the optional Radiation Dose module. The attributes referenced in the Billing and Material Code module are not supported.

This product supports the selection of single or multiple RPS/SPS for a scan. The following are applicable:

- Single SPS selection results in single PPS message.
- Multiple SPS (n) belongs to single RPS is not supported.
- Multiple RPS selection is allowed only if they all correspond to same Patient Name, Patient ID, Patient Sex, DOB, and SPS Date.

At the end of Acquisition, the user might choose to 'Defer PPS' by selection of SUSPEND exam option and later choose to 'Complete PPS' or 'Discontinue PPS' from the User interface provided on the system. In this case, the date and time when user chooses to 'Complete PPS' or 'Discontinue PPS' is taken as the Performed Procedure Step End Date and Performed Procedure End Time respectively (not the actual end date and end time of acquisition).

Mapping of SPS data to MPPS SOP instance is explained in Section 10.1 Modality Performed Procedure Step modules.

Mapping of Specific SPS data to DX DICOM Image Header, for PPS is explained in Section

10.1 Modality Performed Procedure Step modules.

ERROR HANDLING AND RECOVERY

PPS Server AE does not define any extended error codes. The Standard error codes are handled. On a response with status 'success' for the N-CREATE or NSET request, the system updates the state and indicates the same on the User Interface. On a response with status other than 'success' the operation is deemed 'Failed' and the system updates the state and indicates the same on the User interface. If the request has failed or response is not received before the association timeout, the operation is deemed 'Failed' and the system updates the state and indicates the same on the User Interface.

If the operation is 'Failed', detailed message is logged into system log-file and system provides an alternative mechanism to retry the failed operation through the user interface to ensure that transient failures do not affect the feature performance.

Proposed presentation contexts

The following table shows the proposed presentation contexts for the PPS Server AE after any of the real-world activity listed in 2.2.3 Sequencing of real-world activities, is initiated.

Presentation context table - proposed					
Abstract syntax		**Transfer syntax**		**Role**	**Extended negotiation**
Name	**UID**	**Name list**	**UID list**		
Modality Performed	1.2.840.1.10008.3.1.2.3.3	Implicit VR Little	1.2.840.10008.1.2	SCU	None

SOP specific DICOM conformance statement for MPPS SOP class

If the remote AE does not support the proposed Presentation Context, an appropriate error message logged. Only one association is opened at a time.

All the operations used by this SOP class support an association timer, which is configurable. The timer is started when a request (association request: N-CREATE request or N-SET request) is sent and stopped when the respective response is received.

If any of the above timers expires the association is aborted and the operation in progress is considered FAILED.

PPS from Acquisition System with MWL data

The system has a Modality Worklist Server AE installed. Worklist information is obtained from HIS/RIS system through the use of Basic Worklist Management Service. Use of the information retrieved in the creation of Image SOP instance is described in the Modality Worklist Conformance Statement. Use of the information retrieved in MPPS SOP instances is described later in this document.

The system initiates a 'Start PPS' on Start Exam prior to going into the Acquisition Mode. The system retrieves necessary information related to the Scheduled Procedure Step from Modality Worklist Server. PPS Server AE initiates a MPPS (Modality Performed Procedure Step) N-CREATE request to the remote AE (MPPS SCP), in order to create a MPPS SOP instance at the remote AE.

The MPPS SCP returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data and is presented to the user. The DICOM association is closed.

System includes the necessary information related to Scheduled Procedure Steps and the Performed Procedure Step in the image instances created. At the end of image acquisition, system initiates a 'Complete PPS' or 'Discontinue PPS' based on the operator's choice on the User Interface provided. PPS Server AE initiates a MPPS N-SET request to the remote AE, in-order to update the MPPS SOP instance that is already created. The N-SET is sent over a new DICOM association.

The remote AE returns response indicating the success/failure of the request association. The PPS state information is updated in the system based on the response data and is presented to the user.

At the end of Image Acquisition if the User has chosen the Suspend option, the PPS is deferred, and the user can either 'Complete' or 'Discontinue' PPS at a later time. The N-SET is sent over a new DICOM association.

The remote AE returns response indicating the success/failure of the request association. The PPS state information is updated in the system based on the response data and is presented to the user.

2.3.5 DICOM Print SCU AE specification

This Application Entity provides Standard Conformance to the following DICOM V3.0 SOP classes as a SCU:

SOP class name	SOP class UID
Basic Grayscale Print Management Meta SOP class	1.2.840.10008.5.1.1.9

Note: Support of the Basic Grayscale Print Management Meta SOP class as an SCU mandates support for the Basic Film Session, Basic Film Box, Basic Grayscale Image Box and Printer SOP classes as a SCU.

2.3.5.1 Association establishment policies

General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The Maximum Length PDU negotiation is included in all association establishment requests. The maximum length PDU for an association initiated by the DICOM Print SCU is:

Maximum Length PDU	16384

The Print Management Service Class does not support Extended negotiation. The maximum number of Presentation Context Items that will be proposed is 6. The user information Items sent by this product are:

- Maximum PDU Length
- Implementation UID
- Implementation Version Name

Number of associations

The DICOM Print SCU AE supports 2 parallel associations at a time. Requests are internally queued.

Asynchronous nature

Asynchronous mode is not supported. All operations will be performed synchronously.

Implementation identifying information

The implementation UID and implementation version name for this DICOM implementation is:

System implementation UID for Definium Pace Select	1.2.840.113619.6.502
System implementation version name	Values*

2.3.5.2 Association initiation policy

The DICOM Print SCU AE initiates one association with the selected REMOTE DICOM Printer. No other association can be opened by the DICOM Print SCU AE while the current association is active.

Real-world activity: Manual Image print

Associated real world activity

The operator does the following:

1. Select an image in Viewer.
2. Select Print. Print window is displayed.
3. Check or modify selected printer and print parameters (film format, number of copies, pixel depth, etc.).
4. Select Print to confirm.

This operation will cause the DICOM PRINT SCU AE to try to establish the association with the requested printer and sends the images for printing.

Proposed presentation context table

Table 2-30 *Presentation context table – proposed*

Abstract syntax		Transfer syntax		Role	Extended negotiation
Name	**UID**	**Name list**	**UID list**		
Basic Grayscale Print Management Meta SOP	1.2.840.10008.5.1.1.9	Implicit VR Little	1.2.840.10008.1.2	SCU	None

SOP Specific DICOM conformance statement for Print Management SOP classes

For each of the supported Print Management SOP and Meta SOP classes, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior are described in Section 8.

Real-world activity: Automatic image print

Associated real-world activity

The operator does the following:

1. Set Auto-Print ON and define the auto-print parameters using MEDICAL APPLICATION PREFERENCES option of the Browser toolkit menu.
2. Start an exam.
3. Acquire images.
4. Select CLOSE EXAM.

This operation will cause the DICOM PRINT SCU AE to try to establish the association with the requested printer and sends the acquired images for printing.

Proposed presentation context table

Same as real-world activity Manual Image print. Refer section 2.3.5.2.1

SOP Specific DICOM conformance statement for Print Management SOP classes

Same as real world activity Manual Image print. Refer section 2.3.5.2.1

2.4 Communication profiles

2.4.1 Supported communication stacks (PS 3.8)

DICOM Upper Layer Protocol is supported using TCP/IP as specified in DICOM PS 3.8.

2.4.2 TCP/IP stack

The TCP/IP stack is inherited from a LINUX operating system.

2.4.2.1 API

Not applicable to this product.

2.4.2.2 Physical media support

DICOM is indifferent to the Physical medium over which TCP/IP executes (e.g. Ethernet V2.0, IEEE 802.3, ATM, FDDI)

Note: For more information about the Physical Media available on Definium Pace Select system, Refer to the Product Data Sheet.

2.4.3 IPv4 and IPv6 Support

Definium Pace Select supports both IPv4 and IPv6. It is configurable from configuration page.

System SCP services either in IPv4 or IPv6 mode.

System SCU service can be configured per node either in IPv4 or IPv6 mode.

2.4.4 DHCP Support

Definium Pace Select supports static IP configuration only.

2.5 Extensions, specializations, privatizations

2.5.1 Standard extended, specialized, private SOPs

None supported.

2.5.2 Private transfer syntaxes

None supported.

2.6 Configuration

2.6.1 AE Title/presentation address mapping

The Definium Pace Select system allows the user to Add, Remove, and Update the mapping of remote AE titles to IP addresses and ports. These options can be selected from the Network Connections displayed when the Utilities Button is selected on the Worklist.

The system allows the configuration of following items:

DICOM Server AE

AE Title, IP Address, Port Number

Worklist Server AE

AE Title, IP Address, Port Number

Storage Commitment Server AE

AE Title, IP Address, Port Number

Print Server AE

AE Title, IP Address, Port Number

2.6.2 Configurable parameters

The following fields are configurable:

- Local IP Address
- Local IP Netmask
- Default Router IP Address for local network. Only one **default router** IP Address can be configured for **all remote nodes**.

Note: The Local Listening Port Number for C-STORE SCP DICOM service is not configurable and set to **4010**. The Local Listening Port Number for STORAGE COMMITMENT DICOM service is not configurable and set to **4010**.

Note: The local listening port will be **2762** when DICOM TLS is enabled.

The following fields are configurable for every remote DICOM AE including Worklist provider:

- Remote AE Title
- Remote IP Address
- Listening TCP/IP Port Number

2.7 Support of extended character sets

The Definium Pace Select system will support following as extended character set:

Language	Specific character set (0008,0005)
Japanese	ISO 2022 IR 6\ISO 2022 IR 87
Japanese	ISO 2022 IR 13\ISO 2022 IR 87
Korean	ISO 2022 IR 6\ISO 2022 IR 149
Chinese	GB18030
Any	ISO_IR 192
Latin alphabet No. 1	ISO_IR 100

The Definium Pace Select system will reject the worklist entries as invalid if it receives worklist with character set other than supported. In case of images, it saves in local repository but during viewing it may display groveled or special characters.

2.8 Security profiles

The Product does support to security profiles defined in the Chapter 10.

It is assumed that the product is used within a secured environment. It is assumed that a secured environment includes at a minimum:

1. Firewall or router protections to ensure that only approved external hosts have network access to the product.
2. Firewall or router protections to ensure that the product only has network access to approved external hosts and services.
3. Any communications with external hosts and services outside the locally secured environment use appropriate secure network channels, such as a Virtual Private Network (VPN).

Note: The local listening port will be **2762** when DICOM TLS is enabled.

2.9 Support for Grayscale Consistency

The Definium Pace Select system assumes that the DX image will be displayed on a GSDF calibrated grayscale monitor for Display.

The Definium Pace Select system assumes that DX image will be printed on calibrated grayscale printer.

Chapter 3 Media Storage Conformance Statement

3.1 Introduction

This section of the DICOM conformance statement specifies the Definium Pace Select system compliance to DICOM Media Interchange. It details the DICOM Media Storage Application Profiles and roles that are supported by this product.

This station provides capabilities to DICOM interchange on CD-R (Compact Disc-Recordable), DVD-R (Digital Video Disk - Recordable). The Definium Pace Select system works with Digital X-Ray (DX) For Processing, and Digital X-Ray (DX) For Presentation images.

Note that the format of this section strictly follows the format defined in DICOM Standard PS 3.2 (Conformance). Refer to that part of the standard while reading this section.

3.2 Implementation model

3.2.1 Application data flow diagram

The Basic and Specific Application models for the CDR, DVDR devices are shown in Figure 3-1.

SPECIFIC AE APPLICATION MODEL FOR THE CDR DEVICE

Description of the data flow diagram for the CDR and DVDR devices.

The DICOM ARCHIVE/RESTORE functionality for the CDR and DVDR devices are handled by the CDR/DVDR DICOM Media Server AE. The CDR/DVDR DICOM Media Server Application Entity AE is commanded by the user to perform DICOM services operating on the DICOM media using buttons and menu selections on the graphical user interface of the station.

The user requests the creation of a DICOM file set and the writing of this DICOM File Set on a blank CDR or blank DVDR by selecting images in the local Browser and selecting the CDR icon. Images are saved on a mono-session disk in a one-shot operation.

The user can request the reading of a DICOM file set written on a CDR by selecting the CDR or DVDR drive as the active archive device, then browsing the archive using the “Query” Item of the Archive drop down menu, and then restore the selected items by selecting the local browser icon or the suitable restore buttons.

The Application models for the CDR/DVDR device are shown in Figure 3-1.

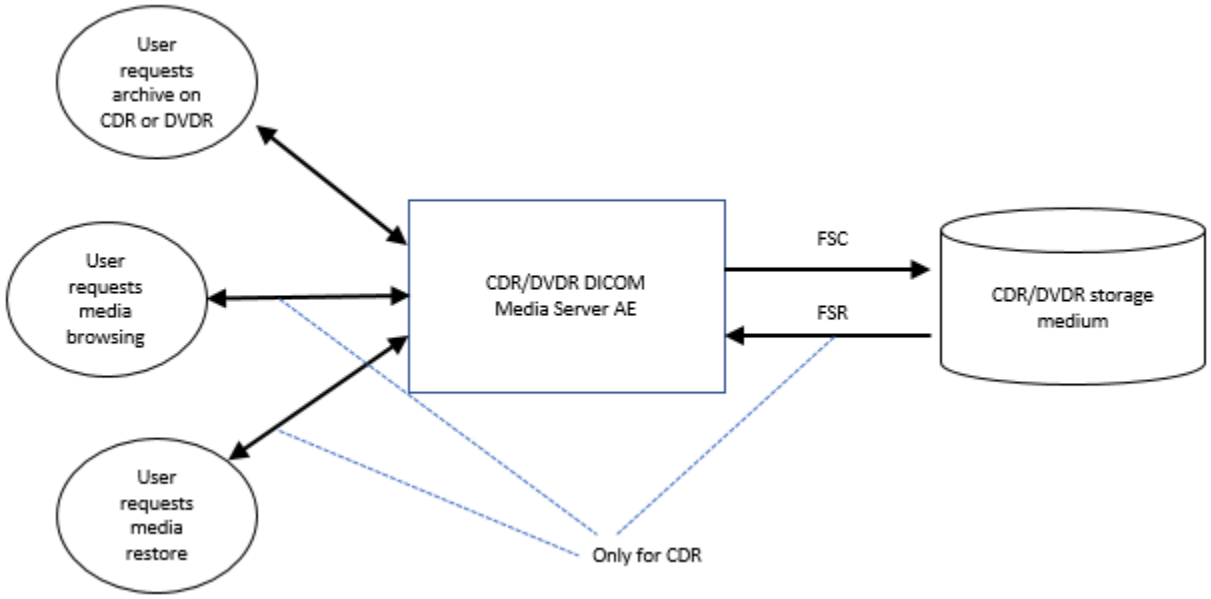


Figure 3-1 Specific AE application model

3.2.2 Functional AE definition

3.2.2.1 Functional definition of DICOM Media Server AE

CDR/DVDR DICOM Media Server AE

The CDR DICOM Media Server AE supports the following functions:

- Has access to patient demographics and pixel data in the local database.
- Can generate a DICOM File Set (FSC) for Digital X-Ray (DX) For Processing, DX For Presentation and RDSR data types in a one-shot activity.
- Can write a DICOM File Set (FSC) on a CDR and DVDR in mono-session.
- Can read a DICOM File Set (FSR) on a CDR.

3.2.3 Sequencing requirements

Non-applicable for writing a CDR or DVDR. For restoring images from a CDR:

1. Browse the CDR
2. Select images to be restored from CDR to the system.
3. System restores images.

3.2.4 File meta information options (see PS3.10)

The file meta-information for this implementation is:

File meta-information version	1
System implementation UID for Definium Pace Select	1.2.840.113619.6.502
System implementation version name	Values*

3.3 AE Specifications

3.3.1 DICOM CDR/DVDR Server AE specification

The DICOM CDR/DVDR Server AE provides standard conformance to DICOM Interchange Option of the Media Storage Service Class. The application Profiles and roles are listed below.

The Definium Pace Select system supports only DVDR and does NOT support DVD-RW.

Supported application profile	Real-world activity	Role (see notes)	Description
STD-GEN-CD	Browse CD	FSR	Interchange
STD-GEN-CD	Restore CD	FSR	Interchange
STD-GEN-CD	Archive CD	FSC	Interchange
STD-GEN-DVD-JPEG	Archive DVD	FSC	Interchange

Note: Archive is available only on blank CDR and DVDR.

Note: Browse and Restore is possible on CDR.

3.3.1.1 File meta information for the DICOM CDR/DVDR Application Entity

Following are the values set in the File Meta Information for this AE Title:

Source Application Entity Title	Set to system host name

3.3.1.2 Real-world activities for the DICOM CDR/DVDR Application Entity

Real-world activity: Browse CD

The CDR DICOM Media Server AE acts as FSR using the interchange option when requested to browse CD.

When the CDR DICOM Media Server AE is requested to provide a directory listing, it reads the File-set and displays the DICOMDIR directory entries, according to the PATIENT, STUDY, SERIES, IMAGE paradigm.

If the DICOMDIR file is not found in the File-set, the CD is ejected out of the drive.

Media storage application profile for the real-world activity Browse CD

For the list of Application Profiles that invoke this AE for the Browse CD real-world activity, see the table in 3.3.1 DICOM CDR Server AE specification.

Options

Following are the SOP classes supported by the real-world activity Browse CD.

Information object definition	SOP class UID	Transfer syntax	Transfer syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1

Real-world activity: Restore CD

The CDR DICOM Media Server AE acts as an FSR using the interchange option when requested to copy SOP instances from the CD to the local database.

The user selects the SOP instances that he wants the DICOM Media Server AE to copy on the local database by selecting the local browser icon or the suitable restore buttons. Once selected, the SOP instances are copied from the media to the local database.

Only, the SOP classes supported by the station are declared to the database in a Transfer syntax supported by the station.

Media storage application profile for real-world activity Restore CD

For the list of Application Profiles that invoke this AE for the Restore CD real-world activity, see the table in 3.3.1 DICOM CDR/DVDR Server AE specification.

Options

Following are the SOP classes supported by the real-world activity Restore CD:

Information object definition	SOP class UID	Transfer syntax	Transfer syntax
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
Digital X-Ray For Processing Image Storage	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Digital X-Ray For Presentation Image Storage	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Radiation Dose Structured Report	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Little Endian	1.2.840.10008.1.2.1

Note: Other objects such as X-Ray Images can be restored but there are some limitations on the system working with such objects.

Note: Radiation dose structured reports display is not supported.

Real-world activity: Archive CD/DVD

The CDR/DVDR DICOM Media Server acts as an FSC using the interchange option when requested to copy SOP Instances from the local database to the CDR.

The user has to insert a blank CD/DVD into the CDR/DVDR drive. Then, the user selects the entries in the local database that he wants the CDR/DVDR DICOM Media Server to copy onto the CD/DVD.

A confirmation pop-up that indicates what can be archived on the CDR/DVDR is displayed. Before writing the CD, the DICOM Media Server checks for the following conditions:

- The inserted media is blank and writable. If the condition is not met, an error is displayed, and the CD/DVD is ejected.
- The corresponding SOP instances have been encoded with the Specific Character Set listed in section 2.7 or DICOM Default Character Set.

The corresponding SOP instances are set to the Transfer syntax defined by the application and copied to the CD/DVD. Unknown Private Data Elements are coded as “UN” for Unknown.

Media storage application profile for real-world activity Archive CD/DVD

This AE can use the STD-GEN-CD or STD-GEN-DVD-JPEG profiles for the real-world activity Archive CD/DVD. Refer to the table in 3.3.1 DICOM CDR/DVDR Server AE specification.

Options

Following are the SOP classes supported by the real-world activity Archive CD/DVD:

Information object definition	SOP class UID	Transfer syntax	Transfer syntax
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little	1.2.840.10008.1.2.1
Digital X-Ray For Processing Image Storage	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Digital X-Ray For Presentation Image Storage	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Radiation Dose Structured Report	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Little Endian	1.2.840.10008.1.2.1

3.3.1.3 SOP Specific conformance statement for SOP Media Storage Directory

Mandatory tags added for all the supported media profiles.

Key Attribute	Tag	Directory Record Type	Type	Notes
Patient's Name	(0010,0010)	PATIENT	2	FSC: Filled if original study has name FSR: Used if not empty.
Patient's ID	(0010,0020)	PATIENT	1	FSC: Filled if original study has patient id. FSR: Used if not empty
Study Date	(0008,0030)	STUDY	1	FSC : Filled. FSR : Used.
Study Time	(0020,0010	STUDY	1	FSC : Filled. FSR : Used.
Study ID	(0020,0011)	STUDY	1	FSC : Filled. FSR : Used.
Series Number	(0020,0011)	SERIES	1	FSC : Filled. FSR : Used.
Instance Number	(0020,0013)	IMAGE	1	FSC : Filled. FSR : Used.

Options for STD-GEN-CD

Specialized tags supported for STD-GEN-CD profile are listed below.

Key Attribute	Tag	Directory Record Type	Type	Notes
Image Type	(0008,0008)	IMAGE	1C	FSC: Present in Image Object. FSR: Used.
Referenced Image Sequence	(0008,1140)	IMAGE	1C	FSC: Not Present in Image Object as original images does not have it. FSR: Not used.
> Referenced SOP Class UID	(0008,1150)	IMAGE	1C	FSC: Present in Image Object if (0008,1140) present. FSR: Not Used.
> Referenced SOP Instance UID	(0008,1155)	IMAGE	1C	FSC: Present in Image Object if (0008,1140) present. FSR: Not Used.

Options for STD-GEN-DVD-JPEG:

Specialized tags supported for STD-GEN-DVD-JPEG profiles are listed below.

Key Attribute	Tag	Directory Record Type	Type	Notes
Patient's Birth Date	(0010,0030)	PATIENT	1C	FSC: Filled if original study has Patient name. FSR: Used if not empty.
Patient's Sex	(0010,0040)	PATIENT	1C	FSC: Filled if original study has Patient sex. FSR: Used if not empty.
Image Type	(0008,0008)	IMAGE	1C	Present in image object.
Rows	(0028,0010)	IMAGE	1	FSC: Filled. FSR: Used.
Columns	(0028,0011)	IMAGE	1	FSC: Filled. FSR: Used.
Institution Name	(0008,0080)	SERIES	1C	FSC: Not filled. FSR: Not used.
Institution Address	(0008,0081)	SERIES	1C	FSC: Not filled. FSR: Not used.
Performing Physicians' Name	(0008,1050)	SERIES	1C	FSC: Not filled. FSR: Not used.
Calibration Image	(0050,0004)	IMAGE	1C	FSC: Not filled. FSR: Not used.
Referenced Image Sequence	(0008,1140)	IMAGE	1C	FSC: Not filled. FSR: Not used.
Lossy Image Compression Ratio	(0028,2112)	IMAGE	1C	FSC: Not filled. FSR: Not used.
Frame of Reference UID	(0020,0052)	IMAGE	1C	FSC: Not filled. FSR: Not used.
Synchronization Frame of Reference UID	(0020,0200)	IMAGE	1C	FSC: Not filled. FSR: Not used.
Number of Frames	(0028,0008)	IMAGE	1C	FSC: Not filled. FSR: Not used.
Acquisition Time Synchronized	(0018,1800)	IMAGE	1C	FSC: Not filled. FSR: Not used.
Acquisition Datetime	(0008,002A)	IMAGE	1C	FSC: Not filled. FSR: Not used.
Image Position (Patient)	(0020,0032)	IMAGE	1C	FSC: Not filled. FSR: Not used.
Image Orientation (Patient)	(0020,0037)	IMAGE	1C	FSC: Not filled. FSR: Not used.
Pixel Spacing	(0028,0030)	IMAGE	1C	FSC: Not filled. FSR: Not used.

3.4 Augmented and private application profiles

No augmented/private profile is implemented.

3.5 Extensions, specializations, privatizations of SOP classes and transfer syntaxes

3.5.1 Extensions, specializations, privatizations of SOP classes

Additional tags added for all supported media export profiles are listed below.

Key attribute	Tag	Directory record type
Accession Number	(0008,0050)	STUDY
Series Description	(0008,103E)	SERIES
Manufacturer Model name	(0008,1090)	SERIES
Manufacturer	(0008,0070)	SERIES
Bits Allocated	(0028,0100)	IMAGE
Bits Stored	(0028,0101)	IMAGE
Sample per Pixel	(0028,0002)	IMAGE
Rows	(0028,0010)	IMAGE
Columns	(0028,0011)	IMAGE

Note: The CDR Browser displays less information than the local Browser.

3.5.2 Private transfer syntax specification

No private Transfer syntax is written on media by the described DICOM DVDR/CDR Server AE of the Definium Pace Select system.

3.6 Configuration

The source AE Title encoded in the File Meta-Information cannot be modified.

Chapter 4 Digital X-ray Information Object Implementation

4.1 Support of extended character sets

The Definium Pace Select system will support following as extended character set:

Language	Specific character set (0008,0005)
Japanese	ISO 2022 IR 6\ISO 2022 IR 87
Japanese	ISO 2022 IR 13\ISO 2022 IR 87
Korean	ISO 2022 IR 6\ISO 2022 IR 149
Chinese	GB18030
Any	ISO_IR 192
Latin alphabet No. 1	ISO_IR 100

Any incoming SOP instance that is encoded using another extended character set will not be installed in the local database.

4.2 Introduction

This section specifies the use of the DICOM Digital X-Ray (DX) Image IOD to represent the information included in DX images produced by this implementation. Corresponding attributes are conveyed using the module construct. The contents of this section are:

Section 4.3 DX IOD implementation

Section 4.4 DX entity-relationship model Section 4.5 IOD module table

Section 4.6 Information module definitions Section 4.7 Private data dictionary

4.3 DX IOD implementation

The DX Image IOD is used in two SOP classes as defined in PS3.4 Storage Service Class, a SOP class for storage of images intended for presentation, and a SOP class for storage of images intended for further processing before presentation. These are distinguished by their SOP class UID and by the Enumerated Value of the mandatory attribute in DX Series module, Presentation Intent Type (0008,0068).

4.4 DX entity-relationship model

The entity-relationship diagram for the DX Image interoperability schema is shown in Figure 4-1. In this figure, the following diagrammatic convention is established to represent the information organization:

- Each entity is represented by a rectangular box
- Each relationship is represented by a diamond shaped box.
- The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown. In other words, the relationship between Series and Image can have up to n Images per Series, but the Patient to Study relationship has 1 Patient for each Study (a Patient can have more than one Study on the system. However, each Study will contain all of the information pertaining to that Patient).

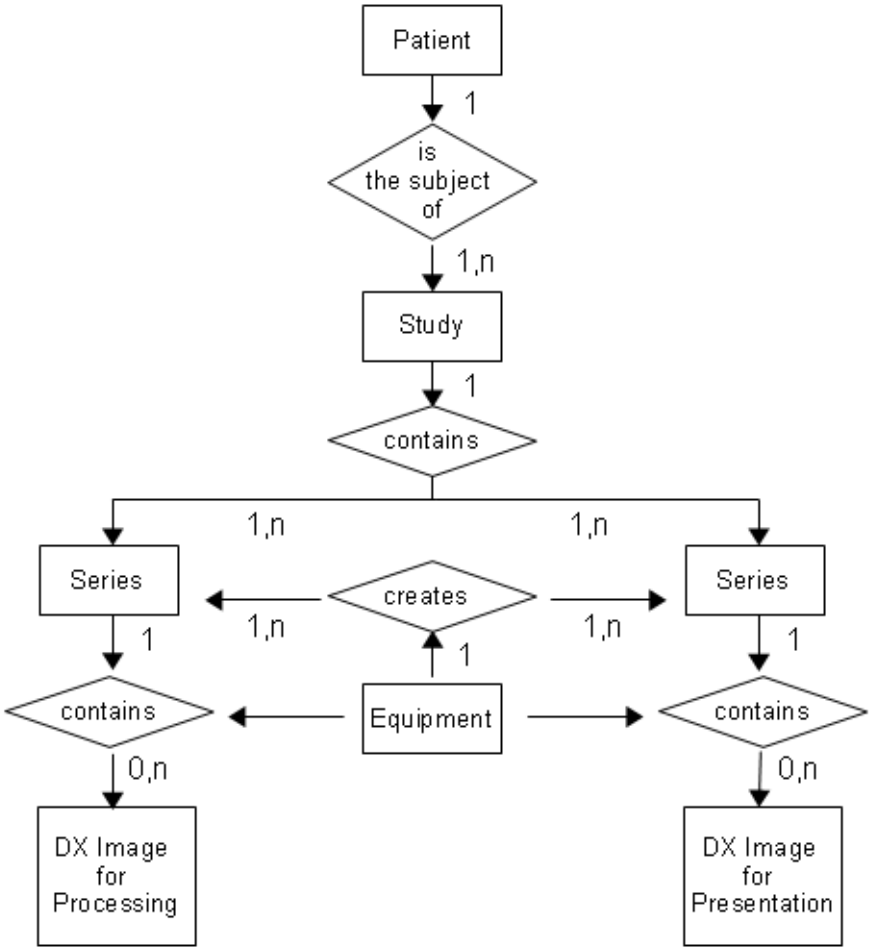


Figure 4-1 DX image entity relationship diagram

4.4.1 Entity descriptions

Refer to DICOM Standard Part 3 (Information object definitions) for a description of each of the entities contained within the DX information object.

4.4.2 Definium Pace Select mapping of DICOM entities

Table 4-1 *Mapping of DICOM entities to Definium Pace Select System Entities*

DICOM entity	System entity
Patient	Patient
Study	Study
Series	Series
Image	Image
Frame	Not applicable

4.5 IOD module table

Within an entity of the DICOM DX IOD, attributes are grouped into related sets of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into data sets.

Table 4-2 identifies the defined modules within the entities that comprise the DICOM DX IOD. Modules are identified by module name.

See DICOM Part 3 for a complete definition of the entities, modules, and attributes.

Table 4-2 DX image IOD modules

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	4.6.1.1 Patient module
	Clinical Trial Subject	Not Used	N/A
Study	General Study	Used	4.6.2.1 General Study module
	Patient Study	Used	4.6.2.2 Patient Study module
	Clinical Trial Study	Used	4.6.2.3 Clinical Trial Study Module
Series	General Series	Used	4.6.3.1 General Series Module
	Clinical Trial Series	Not Used	N/A
	DX Series	Used	4.6.3.2 DX Series module
Frame of Reference	Frame of Reference	Not Used	N/A
Equipment	General Equipment	Used	4.6.4.1 General Equipment module
Acquisition	General Acquisition	Used	4.6.5.1 General Acquisition module
Image	General Image	Used	4.6.6.1 General Image module
	Image Pixel	Used	4.6.6.3 Image Pixel module
	Contrast/Bolus	Not Used	N/A
	Display Shutter	Not Used	N/A
	Device	Not Used	N/A
	Intervention	Not Used	N/A
	Specimen	Not Used	N/A
	DX Anatomy Imaged	Used	4.6.6.4 DX Anatomy Imaged module
	DX Image	Used	4.6.6.5 DX Image module
	DX Detector	Used	4.6.6.6 DX Detector module
	DX Positioning	Used	4.6.6.7 DX Positioning module
	X-Ray Collimator	Used	4.6.6.8 X-Ray Collimator module
	X-Ray Tomography Acquisition	Not Used	N/A
	X-Ray Acquisition Dose	Used	4.6.6.9 X-Ray Acquisition Dose modules
	X-Ray Generation	Used	4.6.6.10 X-Ray Generation module
	X-Ray Filtration	Used	4.6.6.11 X-Ray Filtration module
	X-Ray Grid	Used	4.6.6.12 X-Ray Grid module
	Overlay Plane	Used	4.6.6.13 Overlay Plane module
	VOI LUT	Used	4.6.6.14 VOI LUT module
	Image Histogram	Not Used	N/A
	Acquisition Context	Used	4.6.6.15 Acquisition Context module
	SOP Common	Used	4.6.6.16 SOP Common module
	Common Instance Reference	Not Used	N/A
	Private Module Application module	Used	4.6.7 Application module (private module)

4.6 Information module definitions

Refer to DICOM Standard Part 3 (Information object definitions) for a description of each of the entities and modules contained within the DX information object.

The following modules are included to convey enumerated values, defined terms, and optional attributes supported. Type 1 and Type 2 attributes are also included for completeness and to define what values they may take and where these values are obtained from. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information object definitions).

4.6.1 Common Patient entity modules

4.6.1.1 Patient module

This section specifies the attributes of the Patient that describe and identify the Patient who is the subject of a diagnostic Study. This module contains attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient.

Table 4-3 Patient module attributes

Attribute name	Tag	Type	Attribute description
Referenced Patient Sequence	(0008,1120)	3	This information is present only if retrieved from HISRIS.
>Referenced SOP Class UID	(0008,1150)	1C	
>Referenced SOP Instance UID	(0008,1155)	1C	
Patient's Name	(0010,0010)	2	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Patient ID	(0010,0020)	2	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Patient's Birth Date	(0010,0030)	2	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Patient's Sex	(0010,0040)	2	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Issuer of Patient ID	(0010,0021)	3	Not Supported.
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Supported.
Other Patient IDs	(0010,1000)	3	This information is present only if retrieved from HIS/RIS.
Other Patient Names	(0010,1001)	3	This information is present only if retrieved from HIS/RIS.
Other Patient IDs Sequence	(0010,1002)	3	This information is present only if retrieved from HIS/RIS.
Patient Comments	(0010,4000)	3	This information is present only if retrieved from HIS/RIS

4.6.2 Common Study entity modules

The following Study IE modules are common to all Composite Image IODs that reference the Study IE. These modules contain attributes of the patient and study that are needed for diagnostic interpretation of the image.

4.6.2.1 General Study module

This section specifies the attributes that describe and identify the Study performed upon the Patient.

Table 4-4 General Study module attributes

Attribute name	Tag	Type	Attribute description
Study Date	(0008,0020)	2	The system set to today's date when generating a new study.
Study Time	(0008,0030)	2	The system set to current time when generating a new study.
Accession Number	(0008,0050)	2	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Referring Physician's Name	(0008,0090)	2	The value is loaded from HIS/RIS. When tag is configured for AI, value contains AI result.
Study Description	(0008,1030)	3	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Physician(s) of Record	(0008,1048)	3	The value contains AI result when tag is configured for AI.
Name of Physician(s) Reading Study	(0008,1060)	3	The value contains AI result when tag is configured for AI.
Referenced Study Sequence	(0008,1110)	3	This information is present only if retrieved from HIS/RIS.
>Referenced SOP Class UID	(0008,1150)	1C	
>Referenced SOP Instance UID	(0008,1155)	1C	
Study Instance UID	(0020,000D)	1	The value is loaded from HIS/RIS or is generated by the system.
Study ID	(0020,0010)	2	The value is loaded from HIS/RIS or is generated by the system.
Requesting Service	(0032,1033)	3	The value contains AI result when tag is configured for AI.

4.6.2.2 Patient Study module

This section defines the attributes that provide information about the Patient at the time the Study started.

Table 4-5 Patient Study module attributes

Attribute name	Tag	Type	Attribute description
Admitting Diagnoses Description	(0008,1080)	3	The value contains AI result when tag is configured for AI.
Patient's Age	(0010,1010)	3	Worklist or User Interface or Calculated from Patient's Birth Date (0010,0030). Three digits followed by one letter: In Years (Y), Months (M), Weeks (W) or Days (D). (May not be sent).
Patient's Size	(0010,1020)	3	From User Interface or Worklist, restricted to 16 characters. (May not be sent)
Patient's Weight	(0010,1030)	3	From User Interface or Worklist, restricted to 16 characters. (May not be sent)
Medical Alerts	(0010,2000)	3	The value contains AI result when tag is configured for AI.
Allergies	(0010,2110)	3	The value contains AI result when tag is configured for AI.
Additional Patient History	(0010,21B0)	3	The value contains AI result when tag is configured for AI.
Reason for Visit	(0032,1066)	3	The value contains AI result when tag is configured for AI.
Admission ID	(0038,0010)	3	The value contains AI result when tag is configured for AI.
Service Episode ID	(0038,0060)	3	The value contains AI result when tag is configured for AI.
Service Episode Description	(0038,0062)	3	The value contains AI result when tag is configured for AI.
Patient State	(0038,0500)	3	The value contains AI result when tag is configured for AI.

4.6.2.3 Clinical Trial Study Module

This section defines the attributes that identify a study in the context of a clinical trial or research.

Table 4-6 Patient Study module attributes

Attribute name	Tag	Type	Attribute description
Clinical Trial Time Point ID	(0012,0050)	2	The value contains AI result when tag is configured for AI.
Clinical Trial Time Point Description	(0012,0051)	3	The value contains AI result when tag is configured for AI.

4.6.3 Common Series entity modules

The following Series IE modules are common to all Composite Image IODs that reference the Series IE.

4.6.3.1 General Series module

This section specifies the attributes that identify and describe general information about the Series within a Study.

Table 4-7 General Series module attributes

Attribute name	Tag	Type	Attribute description
Modality	(0008,0060)	1	DX
Series Instance UID	(0020,000E)	1	UID is generated by the system.
Series Number	(0020,0011)	2	Number generated by the system.
Series Date	(0008,0021)	3	The system sets it to today's date when generating a new series.
Series Time	(0008,0031)	3	The system sets it to current time when generating a new series.
Performing Physician's Name	(0008,1050)	3	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Series Description	(0008,103E)	3	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Operators' Name	(0008,1070)	3	The value is loaded from HIS/RIS or is entered by the user using the Medical Procedure Card.
Body Part Examined	(0018,0015)	3	Set to body part examined according to protocol used for acquisition.
Request Attributes Sequence	(0040,0275)	3	This information is present only if retrieved from HIS/RIS.
>Scheduled Procedure Step Description	(0040,0007)	3	This information is present only if retrieved from HIS/RIS.
>Scheduled Protocol Code Sequence	(0040,0008)	3	This information is present only if retrieved from HIS/RIS.
>Scheduled Procedure Step ID	(0040,0009)	1C	This information is present only if retrieved from HIS/RIS.
>Requested Procedure ID	(0040,1001)	1C	This information is present only if retrieved from HIS/RIS.
>Requested Procedure Description	(0032,1060)	3	This information is present only if retrieved from HIS/RIS.
>Requested Procedure Code Sequence	(0032,1064)	3	This information is present only if retrieved from HIS/RIS.
>>Code Value	(0008,0100)	1C	This information is present only if retrieved from HIS/RIS.
>>Coding Scheme Designator	(0008,0102)	1C	This information is present only if retrieved from HIS/RIS.
>>Code Meaning	(0008,0104)	1	This information is present only if retrieved from HIS/RIS.

4.6.3.2 DX Series module

This module contains IOD attributes that describe a Digital X-Ray series performed on the patient.

Table 4-8 DX Series module attributes

Attribute name	Tag	Type	Attribute description
Modality	(0008,0060)	1	Defined Terms: DX (Digital X-Ray)
Presentation Intent Type	(0008,0068)	1	Enumerated Values: FOR PRESENTATION, FOR PROCESSING

4.6.4 Common Equipment entity modules

The following Equipment IE module is common to all Composite Image IODs that reference the Equipment IE.

4.6.4.1 General Equipment module

This section specifies the attributes that identify and describe the piece of equipment that produced a Series of Images.

Table 4-9 General Equipment module attributes

Attribute name	Tag	Type	Attribute description
Manufacturer	(0008,0070)	2	Value set to “GE Healthcare”
Institution Name	(0008,0080)	3	Value comes from configuration file
Institution Address	(0008,0081)	3	Value comes from configuration file
Station Name	(0008,1010)	3	Value comes from configuration file
Institutional Department Name	(0008,1040)	3	Value comes from configuration file
Manufacturer's Model Name	(0008,1090)	3	Value set to “Definium Pace Select”
Software Versions	(0018,1020)	3	Value set to software version of library that produces SOP instance.

4.6.5 Common Acquisition entity modules

The following Acquisition IE Modules are common to all Composite Image IODs that reference the Acquisition IE.

4.6.5.1 General Acquisition module

This section specifies the Attributes of the General Acquisition Module, which identify and describe general information about an Acquisition.

Table 4-10 General Acquisition module attributes

Attribute name	Tag	Type	Attribute description
Acquisition UID	(0008,0017)	3	Not added.
Acquisition Number	(0008,0012)	3	Not added.
Acquisition Date	(0008,0022)	3	Set to date of acquisition of raw data.
Acquisition Time	(0008,0032)	3	Set to time of acquisition of raw data.
Acquisition DateTime	(0008,002A)	3	Set to date and time of acquisition of raw data.
Acquisition Duration	(0018,9073)	3	Not added. Refer to (0018,1150) Exposure Duration.
Images in Acquisition	(0020,1002)	3	Not added.
Irradiation Event UID	(0008,3010)	3	Unique identification of the irradiation event(s) associated with the acquisition of this instance.

4.6.6 Common Image entity modules

The following Image IE modules are common to all Composite Image IODs that reference the Image IE.

4.6.6.1 General Image module

This section specifies the attributes that identify and describe an image within a particular series.

Table 4-11 General Image module attributes

Attribute name	Tag	Type	Attribute description
Image Type	(0008,0008)	3	Value 1 Enumerated Values: - ORIGINAL, identifies an Original Image

Attribute name	Tag	Type	Attribute description
			- DERIVED, identifies a Derived Image Value 2 Enumerated Values: - PRIMARY, identifies a Primary Image - SECONDARY, identifies a Secondary Image Value 3 is left EMPTY.
Content Date	(0008,0023)	2C	Set by the system when building the image. Equal to Acquisition Date in DX For Processing image.
Content Time	(0008,0033)	2C	Set by the system when building the image. Equal to Acquisition Time in DX For Processing image.
Source Image Sequence	(0008,2112)	3	Only sent in DX for Presentation Images.
>Referenced SOP Class UID	(0008,1150)	1C	
>Referenced SOP Instance UID	(0008,1155)	1C	
Icon Image Sequence	(0088,0200)	3	
>Samples Per Pixel	(0028,0002)	1C	Always set to 1
>Photometric Interpretation	(0028,0004)	1C	Always set to “MONOCHROME2”
>Rows	(0028,0010)	1C	Always <= 64
>Columns	(0028,0011)	1C	Always <= 64
>Bits Allocated	(0028,0100)	1C	Always equal to 8
>Bits Stored	(0028,0101)	1C	Always equal to 8
>High Bit	(0028,0102)	1C	Always equal to 7
>Pixel Representation	(0028,0103)	1C	Always equal to 0
>Pixel Data	(7FE0,0010)	1C	
Instance Number	(0020,0013)	2	Number generated by the system
Patient Orientation	(0020,0020)	2C	Set according to the clinical view. Example: For chest PA, it is set to R/F
Quality Control Image	(0028,0300)	3	Always set to NO
Burned In Annotation	(0028,0301)	3	Always set to NO
Lossy Image Compression	(0028,2110)	3	Always set to 00

Note: (0028,135A) – Spatial Locations Preserved Tag is not added by this product into DX images.

4.6.6.2 General Reference module

Source Image Sequence references the SOP Instance UID of the raw image (DX for Processing image) from which this processed image (DX for Presentation image) was created.

4.6.6.3 Image Pixel module

This section specifies the attributes that describe the pixel data of the image.

Table 4-12 Image Pixel module attributes

Attribute name	Tag	Type	Attribute description
Samples Per Pixel	(0028,0002)	1	Always set to 1
PhotometricInterpretation	(0028,0004)	1	Set to: - MONOCHROME1 in DX For Processing images.

Attribute name	Tag	Type	Attribute description
			- MONOCHROME2 in DX For Presentation images.
Rows	(0028,0010)	1	<= 4236 For Processing images.
Columns	(0028,0011)	1	<= 4236 For Processing images.
Bits Allocated	(0028,0100)	1	Set to 16
Bits Stored	(0028,0101)	1	Set to 16 or 14 depending on configuration
High Bit	(0028,0102)	1	Set to 15 or 13 depending on configuration.
Pixel Representation	(0028,0103)	1	Always set to 0000H (unsigned integer)
Pixel Data	(7FE0,0010)	1	Set to the data stream of the pixel samples that comprise the Image.

4.6.6.4 DX Anatomy Imaged module

The table in this section contains IOD attributes that describe the anatomy contained in a DX IOD.

Note:

- Software Build 2.x: Always set to SRT.
- Software Build 3.x and above: Set to SRT or SCT based on the configuration.

Table 4-13 DX Anatomy Imaged module attributes

Attribute name	Tag	Type	Attribute description
Image Laterality	(0020,0062)	1	Enumerated Values: R = right L = left U = unpaired B = both left and right
Anatomic Region Sequence	(0008,2218)	1	Identifies anatomic region of interest and consists of only one item.
>Code Value	(0008,0100)	1C	Set to code corresponding to anatomic region. Example: T-D3000 or 51185008 for Chest T-11501 or 122494005 for Cervical spine
>Coding Scheme Designator	(0008,0102)	1C	Set to “SRT” or “SCT” according to the configuration.
>Code Meaning	(0008,0104)	1C	Set to code meaning corresponding to anatomic region sequence Code Value. Example: Set to Chest if code = T-D3000 or 51185008 Set to Cervical spine if code = T-11501 or 122494005

4.6.6.5 DX Image module

The table in this section contains IOD attributes that describe a DX image by specializing attributes of the General Image and Image Pixel modules and adding additional attributes.

Table 4-14 DX Image module attributes

Attribute name	Tag	Type	Attribute description
Image Type	(0008,0008)	1	Value 1 Enumerated Values: - ORIGINAL, identifies an Original Image - DERIVED, identifies a Derived Image Value 2 Enumerated Values: - PRIMARY, identifies a Primary Image - SECONDARY, identifies a Secondary Image Value 3 is left EMPTY.
Samples Per Pixel	(0028,0002)	1	Always set to 1
PhotometricInterpretation	(0028,0004)	1	Set to MONOCHROME1 in DX For Processing images. Set to MONOCHROME2 in DX For Presentation images.
Bits Allocated	(0028,0100)	1	Set to 16
Bits Stored	(0028,0101)	1	Set to 16 or 14 depending on configuration
High Bit	(0028,0102)	1	Set to 15 or 13 depending on configuration.
Pixel Representation	(0028,0103)	1	Always set to 0000H (unsigned integer)
Pixel Intensity Relationship	(0028,1040)	1	Set to LIN in DX For Processing images. Set to LOG in DX For Presentation images.
Pixel Intensity Relationship Sign	(0028,1041)	1	Set to +1 in DX For Processing images. Set to -1 in DX For Presentation images.
Rescale Intercept	(0028,1052)	1	Always set to 0.
Rescale Slope	(0028,1053)	1	Always set to 1.
Rescale Type	(0028,1054)	1	Always set to US.
Presentation LUT Shape	(2050,0020)	1	Set to “INVERSE” in DX For Processing images. Set to “IDENTITY” in DX For Presentation images.
Lossy Image Compression	(0028,2110)	1	Always set to 00
Acquisition Device Processing Description	(0018,1400)	3	Sent only in DX For Presentation Images. Set to the processing look code used to process the image.
Patient Orientation	(0020,0020)	1	Set according to the clinical view. Example: For chest PA, it is set to R/F
Burned In Annotation	(0028,0301)	1	Always set to NO
Window Center	(0028,1050)	1C	Sent in DX For Presentation Images. Up to three values are present in the For Presentation DX images.
Window Width	(0028,1051)	1C	Sent in DX For Presentation Images. Up to three values are present in the For Presentation DX images.
Window Center and Width Explanation	(0028,1055)	3	Sent in DX For Presentation Images. Up to three values are present.
VOI LUT Sequence	(0028,3010)	1C	Up to 3 items can be present in this sequence. Sequence is only present when the system is configured to generate the VOI LUT Sequence.

Attribute name	Tag	Type	Attribute description
> LUT Descriptor	(0028,3002)	1C	Specifies the format of the LUT data in this sequence. Required if the VOI LUT Sequence is sent.
> LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.
> LUT Data	(0028,3006)	1C	LUT data in this sequence. Required if the VOI LUT Sequence is sent.

Note: There is option to remove VOI LUT Sequence before sending to specific DICOM host.

4.6.6.6 DX Detector module

The table in this section contains IOD attributes that describe a DX detector.

Table 4-15 DX Detector module attributes

Attribute name	Tag	Type	Attribute description
Field of View Shape	(0018,1147)	3	Set to “RECTANGLE”
Field of View Dimensions	(0018,1149)	3	Dimensions in mm of the field of view, that is the image pixels stored in Pixel Data (7FE0, 0010). Row dimension \ Column dimension Note: 90-degree rotations sway Row \ Column values
Imager Pixel Spacing	(0018,1164)	1	Physical distance measured at the front plane of the detector housing between the center of each image pixel specified by a numeric pair in mm: Row spacing value \ Column spacing value.
Pixel Spacing	(0028,0030)	1C	Physical distance in the patient between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm: Row spacing value \ Column spacing value.
Exposure Index	(0018,1411)	3	Measure of the detector response to radiation in the relevant image region of an image acquired with a digital x-ray imaging system as defined in IEC 62494-1.
Target Exposure Index	(0018,1412)	3	The target value used to calculate the Deviation Index (0018,1413) as defined in IEC 62494-1.
Deviation Index	(0018,1413)	3	A scaled representation of the difference of the Exposure Index compared to the Target Exposure Index.
Sensitivity	(0018,6000)	3	Detector sensitivity in manufacturer specific units.
Detector Temperature	(0018,7001)	3	Set to Detector Surface Temperature in degrees Celsius.
Detector Type	(0018,7004)	2	Set to “SCINTILLATOR”
Detector Configuration	(0018,7005)	3	Set to “AREA”
Detector ID	(0018,700A)	3	Set to Detector Serial Number.
Detector Binning	(0018,701A)	3	Set to 1\1
Detector Element Physical Size	(0018,7020)	3	Set to detector physical dimension in mm: Row \ Column
Detector Element Spacing	(0018,7022)	3	Physical distance between the center of each detector element specified by Row dimension and column dimension.
Detector Active Shape	(0018,7024)	3	Set to “RECTANGLE”
Detector Active Dimensions	(0018,7026)	3	Set to detector activate dimension in mm:

Attribute name	Tag	Type	Attribute description
			Row \ Column
Field of View Origin	(0018,7030)	1C	Coordinates of the FOV upper left corner relative to the Processing Image.
Field of View Rotation	(0018,7032)	1C	Set to value of clockwise rotation in degrees of Field of View related to the physical detector. Sent if Field of View Horizontal Flip is sent.
Field of View Horizontal Flip	(0018,7034)	1C	Enumerated values: YES, NO Sent if Field of View Rotation is sent.

4.6.6.7 DX Positioning module

The table in this section contains IOD attributes that describe the positioning used in acquiring DX image.

Table 4-16 DX Positioning module attributes

Attribute name	Tag	Type	Attribute description
View Position	(0018,5101)	3	It consists of View information of the acquired image. Example: PA, AP, LAT.
View Code Sequence	(0054,0220)	3	One item is sent in this sequence.
> Code Value	(0008,0100)	3	
> Code Scheme Designator	(0008,0102)	3	Always set to “SRT”
> Code Meaning	(0008,0104)	3	
>View Modifier Code Sequence	(0054,0222)	3	
Patient Orientation Code Sequence	(0054,0410)	3	One item is sent in this sequence.
> Code Value	(0008,0100)	3	
> Code Scheme Designator	(0008,0102)	3	Always set to “SRT”
> Code Meaning	(0008,0104)	3	
>Patient Orientation Modifier Code Sequence	(0054,0412)	3	One item is sent in this sequence.
>> Code Value	(0008,0100)	3	
>> Code Scheme Designator	(0008,0102)	3	Always set to “SRT”
>> Code Meaning	(0008,0104)	3	
Positioner Type	(0018,1508)	2	Set to zero length value.

4.6.6.8 X-Ray Collimator module

The DICOM optional X-Ray Collimator module is always provided and describes the collimation applied on the acquired DX image.

The table in this section contains IOD attributes that describe the collimation applied while acquiring the DX image.

Table 4-17 X-Ray Collimator module attributes

Attribute name	Tag	Type	Attribute description
Collimator Shape	(0018,1700)	1	Set to “POLYGONAL”.
Collimator Vertices	(0018,1720)	1C	Set to 8 vertices.

4.6.6.9 X-Ray Acquisition Dose modules

This section specifies the attributes that describe the acquisition parameters used when acquiring image.

Table 4-18 X-Ray Acquisition Dose module attributes

Attribute name	Tag	Type	Attribute description
KVP	(0018,0060)	3	Set to peak kilo voltage output of X-Ray generator.
Exposure Time	(0018,1150)	3	Set to duration of X-Ray exposure. Unit: ms
X-Ray Tube Current	(0018,1151)	3	Technique set in protocol or by user selection. Unit: mA
Exposure	(0018,1152)	3	Technique set in protocol or by user selection. Unit: mAs
Exposure in µAs	(0018,1153)	3	Technique set in protocol or by user selection. Unit: µAs
Distance Source to Detector	(0018,1110)	3	Source Image Receptor Distance (SID), the distance in mm from source to detector center. Set to the recommended value in the protocol database. Unit: mm
Distance Source to Patient	(0018,1111)	3	Source Object Distance (SOD), the distance in mm from source to the table/wallstand/detector surface (depends on exposure mode) that is closest to the Imaging Subject, as measured along the central ray of the X-Ray beam. Set to the recommended value minus the OID. Unit: mm
Image Area Dose Product	(0018,115E)	3	If DAP is enabled, set to X-Ray dose, measured in dGy*cm*cm, to which patient was exposed for the acquisition of this image. Will be empty if user does not enter DAP value.
Relative X-Ray Exposure	(0018,1405)	3	Calculated applied dose. Unit: µGy.
Exposure Index	(0018,1411)	3	Measure of the detector response to radiation in the relevant image region of an image acquired with a digital x-ray imaging system as defined in IEC 62494-1.
Target Exposure Index	(0018,1412)	3	The target value used to calculate the Deviation Index (0018,1413) as defined in IEC 62494-1.
Deviation Index	(0018,1413)	3	A scaled representation of the difference of the Exposure Index compared to the Target Exposure Index.
Entrance Dose In mGy	(0040,8302)	3	Calculated applied dose. Unit: mGy.

4.6.6.10 X-Ray Generation module

This section specifies the attributes that describe the X-ray generation when acquiring the image.

Table 4-19 X-Ray Generation module attributes

Attribute name	Tag	Type	Attribute description
KVP	(0018,0060)	3	Set to peak kilo voltage output of X-Ray generator.
X-Ray Tube Current	(0018,1151)	3	Technique set in protocol or by user selection. Unit: mA
Exposure Time	(0018,1150)	3	Set to duration of X-Ray exposure. Unit: ms
Exposure	(0018,1152)	3	Technique set in protocol or by user selection. Unit: mAs
Exposure in µAs	(0018,1153)	3	Technique set in protocol or by user selection. Unit: µAs
Focal Spot	(0018,1190)	3	Set to 0.6 or 1.20 by user selection in acquisition.
Exposure Control Mode	(0018,7060)	3	Set to “AUTOMATIC” when AEC is applied. Set to “MANUAL” when AEC is not applied.

4.6.6.11 X-Ray Filtration module

This section specifies the attributes that describe the filtration of X-rays during acquisition of X-ray image.

Table 4-20 X-Ray Filtration module attributes

Attribute name	Tag	Type	Attribute description
Filter Type	(0018,1160)	3	Set to “FLAT” if filter is applied. Set to “NONE” if filter is not applied.
Filter Material	(0018,7050)	3	Set to “ALUMINUM” if filter is used.
Filter Thickness Minimum	(0018,7052)	3	Set by user selection. Equal to Filter Thickness Maximum.
Filter Thickness Maximum	(0018,7054)	3	Set by user selection. Equal to Filter Thickness Minimum.

4.6.6.12 X-Ray Grid module

This section specifies the attributes that describe the grid used during acquisition.

Table 4-21 X-Ray Grid module attributes

Attribute name	Tag	Type	Attribute description
Grid	(0018,1166)	3	Set to “FIXED\FOCUSED” if grid is applied. Set to “NONE” if Grid is not applied.
Grid Focal Distance	(0018,704C)	3	Set by user selection of grid, 100 or 130. Unit mm. Set to recommended value if auto grid is applied.

4.6.6.13 Overlay Plane module

An Overlay Plane describes graphics or bit-mapped text that is associated with an Image or has it own existence within a Series. It may also describe a region of Interest in an Image.

Each Overlay Plane is one bit deep. Sixteen separate Overlay Planes may be associated with an Image or exist as Standalone Overlays in a Series. This product supports only one plane & encoded in 6000 group.

Table 4-22 Overlay Plane module

Attribute name	Tag	Type	Attribute description
Overlay Rows	(6000,0010)	1	Number of Rows in Overlay
Overlay Columns	(6000,0011)	1	Number of Columns in Overlay.
Overlay Type	(6000,0040)	1	Indicates whether this overlay represents a region of interest or other graphics. Value = G
Overlay Subtype	(6000,0045)	3	Defined term that identifies the intended purpose of Overlay Type. Value = USER
Overlay Origin	(6000,0050)	1	Location of first Overlay point with respect to pixels in the image given as row\column. Value = 1\1
Overlay Bits Allocated	(6000,0100)	1	Number of bits allocated in the overlay. Value = 1
Overlay Bit Position	(6000,0102)	1	Bit in which Overlay is stored. Value = 0
Overlay Data	(6000,3000)	1C	Overlay Pixel Data.

4.6.6.14 VOI LUT module

The table in this section contains IOD attributes that describe the VOI LUT.

Table 4-23 VOI LUT module attributes

Attribute name	Tag	Type	Attribute description
VOI LUT Sequence	(0028,3010)	3	Three items are present in this sequence. Sequence is only present when the system is configured to generate the VOI LUT Sequence.
> LUT Descriptor	(0028,3002)	1C	Specifies the format of the LUT data in this sequence. Required if the VOI LUT Sequence is sent.
>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.
>LUT Data	(0028,3006)	1C	LUT data in this sequence. Required if the VOI LUT Sequence is sent.
Window Center	(0028,1050)	1C	Sent in DX For Presentation Images. Up to four values are present in the “For Presentation” DX images. The fourth value is present when the operator adjusts and saves the window center during image review. The other values are defined as preset values (Normal, Harder, Softer) during acquisition.
Window Width	(0028,1051)	1C	Sent in DX For Presentation Images. Up to four values are present in the “For Presentation” DX images. The fourth value is present when the operator adjusts and saves the window width during image review. The other values are defined as preset values (Normal, Harder, Softer) during acquisition.
Window Center and Width Explanation	(0028,1055)	3	Sent in DX For Presentation Images. Up to four values are present.

Note: The system supports remove the VOI LUT sequence before sending image to Storage SCP.

4.6.6.15 Acquisition Context module

The table in this section contains IOD attributes that describe the acquisition context while acquiring the DX image.

Table 4-24 Acquisition Context module attributes

Attribute name	Tag	Type	Attribute description
Acquisition Context Sequence	(0040,0555)	2	Zero length value is sent unless it is necessary to convey concept of flexion or extension, in which case one item is sent.
>Value Type	(0040,A040)	1	
>Concept Name Code Sequence	(0040,A043)	1	Coded concept name of this name-value Item. Only a single Item shall be included in this Sequence.
>>Code Value	(0008,0100)	1	
>>Coding Scheme Designator	(0008,0102)	1	
>>Code Meaning	(0008,0104)	1	
>Concept Code Sequence	(0040,A168)	1C	Coded concept value of this name-value Item. Only a single Item shall be included in this Sequence. Required if Value Type (0040,A040) is CODE.
>>Code Value	(0008,0100)	1	
>>Coding Scheme Designator	(0008,0102)	1	
>>Code Meaning	(0008,0104)	1	

4.6.6.16 SOP Common module

This section defines the attributes that are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the real-world object represented by the IOD.

Table 4-25 SOP Common module attributes

Attribute name	Tag	Type	Attribute description
Specific Character Set	(0008,0005)	1C	Set to one of character sets listed in Section 4.1
SOP Class UID	(0008,0016)	1	
SOP Instance UID	(0008,0018)	1	
Instance Number	(0020,0013)	3	

4.6.7 Application modules (private modules)

Application module is a private module.

The table in this section contains attributes that describe various information required by the Definium Pace Select Medical Application.

Table 4-26 Application module private attributes

Attribute name	Tag	Type	Attribute description	VR	VM
Private Creator	(0011,0010)	1	GEMS_GDXE_FALCON_04	LO	1
Processed Series UID	(0011,1003)	3	Processed Series UID	UI	1
Acquisition Type	(0011,1004)	3	Acquisition Type	CS	1
Acquisition UID	(0011,1005)	3	Acquisition UID	UI	1
Non-Digital Exposures	(0011,1009)	3	Non-Digital Exposures	SL	1
Total Exposures	(0011,1010)	3	Total Exposures	SL	1
ROI	(0011,1011)	3	ROI	LT	1
Patient Size String	(0011,1012)	3	Patient Size String	LT	1
SPS UID	(0011,1013)	3	SPS UID	UI	1
Detector ARC Gain	(0011,1015)	3	Detector ARC Gain	DS	1
Processing Debug Info	(0011,1016)	3	Processing Debug Info	LT	1
Film Speed Selection	(0011,1019)	3	Film Speed Selection	DS	1
Detected Field of View	(0011,1031)	3	Actual collimator FOV	IS	8
Adjusted Field of View	(0011,1032)	3	Output of ICED algorithm. Value from user manual adjustment. Note: When the collimator is rotated, the stored vertices are those of the rectangle circumscribing the polygonal collimator.	IS	8
Compensated Detector Exposure	(0011,1034)	3	Compensated Detector Exposure	DS	1
Median Anatomy Count Value	(0011,1036)	3	Median Anatomy count value	DS	1
DEI Lower and Upper Limit Values	(0011,1037)	3	DEI lower and upper limit values	DS	4
View IP	(0011,1042)	3	View prescribed	LO	1
Receptor Type	(0011,1044)	3	Digital cassette	CS	1
Acquisition Device Processing Description	(0011,1046)	3	Acquisition Device Processing Description	LO	5

Attribute name	Tag	Type	Attribute description	VR	VM
Conversion Factor	(0011,1047)	3	Calibration for a specified detector	DS	1
Grid Position	(0011,1059)	3	Determines the orientation of the Grid	CS	1
RRA Classification	(0011,1062)	3	Only present if RRA is enabled. Only present in Presentation Images. RRA classification for repeat acquisitions, for unnecessary images for non-clinical images is filled in this tag.	LO	1
RRA Reason	(0011,1063)	3	Only present if RRA is enabled. Only present in Presentation Images. Values consists of reason for repeat acquisition.	LO	1
Detector Type	(0011,1064)	3	Type of detector used during exposure	LO	1
Derived Receptor Type	(0011,1065)	3	Position of the detector during exposure	LO	1
Extension Cable in Use	(0011,1066)	3	Indicates if the extension cable was in use	SH	1
Detector Port in Use	(0011,1067)	3	Table port in use	SH	1
MAC Address	(0011,1068)	3	Detector Mac Address	LO	1
Detector Height Correction	(0011,1069)	3	Distance from Detector to the Table/WS patient barrier. This tag is only used for the Tomo Recon feature and Image Pasting.	DS	1
Default Normal LUT	(0011,106B)	3	LUT for JEG conversion. Only present in Presentation Images.	OW	1-n
Uncompensated Sensitivity	(0011,106D)	3	Is defined as the conversion efficiency of the detector	DS	1
Patient Orientation Original Value	(0011,1076)	3	Patient Orientation Original Value	CS	2
Fast Preview Quantifications Sufficient Value	(0011,1077)	3	Fast Preview Quantifications Sufficient Value	CS	1
Fast Preview Final Min Value	(0011,1078)	3	Fast Preview Final Min Value	DS	1
Fast Preview Final Max Value	(0011,1079)	3	Fast Preview Final Max Value	DS	1
Fast Preview R1 Value	(0011,107A)	3	Fast Preview R1 Value	SS	1
Fast Preview R2 Value	(0011,107B)	3	Fast Preview R2 Value	SS	1
Fast Preview Sign Changed	(0011,107C)	3	Fast Preview Sign Changed	CS	1
Grid Line Reduction Applied	(0011,107D)	3	Grid Line Reduction Applied	CS	1
Detector Orientation	(0011,107E)	3	Detector Orientation	DS	1
DEI Status	(0011,1080)	3	DEI Status	IS	1
Hanging Protocol	(0011,1081)	3	View Name for DX Image	LO	1
Pasting COI	(0011,1084)	3	COI Information for Pasting. Filled only in case Image Pasting	DS	1
Pasting Patient Barrier Distance	(0011,1085)	3	Patient Barrier Distance. Filled only in case Image Pasting	DS	1
Detector Direction	(0011,10A1)	3	Detector Direction	CS	1
AutoGrid Strength	(0011,10A2)	3	AutoGrid Strength	SH	1
Grid Recommended	(0011,10A3)	3	Grid Recommended	SH	1
Image Initial Rows	(0011,10A4)	3	Image Initial Rows	US	1
Image Initial Columns	(0011,10A5)	3	Image Initial Columns	US	1

Attribute name	Tag	Type	Attribute description	VR	VM
MAR Status	(0011,10A9)	3	MAR Status	CS	1
LCE Setting In IP Looks	(0011,10AA)	3	LCE Setting in IP Looks	SH	1
Rotation Angle Context	(0011,10AB)	3	Rotation Angle Context	ST	1
Initial Window Width	(0011,10B9)	3	Initial Window Width	DS	1-n
Initial Window Center	(0011,10BA)	3	Initial Window Center	DS	1-n
Pre Final Window Width	(0011,10BB)	3	Pre Final Window Width	DS	1-n
Pre Final Window Center	(0011,10BC)	3	Pre Final Window Center	DS	1-n
AI Inferencing Engine Output	(0011,10BD)	3	AI Inferencing Engine Output	LT	1
Brighness Adjustment	(0011,10BE)	3	Brighness Adjustment	DS	1-n
Contrast Adjustment	(0011,10BF)	3	Contrast Adjustment	DS	1-n
Brighness AI	(0011,10C0)	3	Brighness AI	DS	1-n
Contrast AI	(0011,10C1)	3	Contrast AI	DS	1-n
Brighness Deviation	(0011,10C2)	3	Brighness Deviation	DS	1-n
Contrast Deviation	(0011,10C3)	3	Contrast Deviation	DS	1-n
Final Iteration Count	(0011,10C4)	3	Final Iteration Count	DS	1-n
Study Dose	(0011,10C7)	3	Study Dose	DS	1
Study DAP	(0011,10C8)	3	Study DAP	DS	1
NonDigital Exposures	(0011,10C9)	3	NonDigital Exposures	IS	1
Total Exposures	(0011,10CA)	3	Total Exposures	IS	1
DPNR Stength value	(0011,10D0)	3	DPNR strength value	SH	1
DPNR snrComputation number	(0011,10D1)	3	DPNR snr computation number	IS	1
DPNR Lamda Value	(0011,10D2)	3	DPNR lamda value	DS	1
DPNR snrCoeff slop and intercept	(0011,10D3)	3	DPNR snr coefficient slope and intercept	DS	2
Last User Action	(0011,10D4)	3	Last user action of rotate and flip of image	LO	1
MR Edge number	(0011,10D5)	3	MR Edge number	DS	1
Private Creator	(0045,0010)	1	GEMS_GDXE_RAD_PRODUCT	LO	1
A_Coefficients	(0045,1055)	3	Used in Multi-resolution Algorithm	DS	8
User Window Center	(0045,1062)	3	User Window Center	IS	1
User Window Width	(0045,1063)	3	User Window Width	IS	1
VOI LUT Asymmetry Parameter Beta	(0045,1067)	3	Used for calculating Asymmetric LUT	DS	3
Anatomical Laterality	(0045,1077)	3	Anatomical Laterality	SH	1
Private Creator	(00A1,0010)	1	GEMS_GDXE_AI_TAG	LO	1
CCS Collective Result	(00A1,10B1)	3	CCS Collective Result	CS	1
CCS Algorithm finding	(00A1,10B2)	3	CCS Algorithm finding	LT	1
CCS Configuration parameters	(00A1,10B3)	3	CCS Configuration parameters	LT	1
Algorithms Executed	(00A1,10B4)	3	Algorithms Executed	CS	1-n
Algorithms results	(00A1,10B5)	3	Algorithms results	CS	1-n
Confidence scores	(00A1,10B6)	3	Confidence scores	DS	1-n
Customer configured threshold	(00A1,10B7)	3	Customer configured threshold	DS	1-n
Rotation Angle	(00A1,10B8)	3	Rotation Angle	SS	1
Private Creator	(7FDF,0010)	1	GEMS_GDXE_ATHENAV2_INTERNAL_USE	LO	1

Attribute name	Tag	Type	Attribute description	VR	VM
PPS Stream	(7FDF,1010)	3	Pixel Data References	LT	1
Auto Push Tag	(7FDF,1020)	3	Auto Push Tag	SS	1
Exam Status Tag	(7FDF,1025)	3	Exam Status Tag	CS	1

4.7 Private data dictionary

The table in this section describes the private attributes contained in DX images.

Table 4-27 Private creator identification - Private creator for GEMS_GDXE_FALCON_04

Attribute name	Tag	Type	Attribute description	VR	VM
Private Creator	(0011,0010)	1	GEMS_GDXE_FALCON_04	LO	1
ExamType	(0011,0057)	3	ExamType	CS	1
Processed Series UID	(0011,1003)	3	Processed Series UID	UI	1
Acquisition Type	(0011,1004)	3	Acquisition Type	CS	1
Acquisition UID	(0011,1005)	3	Acquisition UID	UI	1
Image Dose	(0011,1006)	3	Image Dose	DS	1
Study Dose	(0011,1007)	3	Study Dose	FL	1
Study DAP	(0011,1008)	3	Study DAP	FL	1
NonDigital Exposures	(0011,1009)	3	NonDigital Exposures	SL	1
Total Exposures	(0011,1010)	3	Total Exposures	SL	1
ROI	(0011,1011)	3	ROI	LT	1
Patient Size string	(0011,1012)	3	Patient Size string	LT	1
SPS UID	(0011,1013)	3	SPS UID	UI	1
PPS UID	(0011,1014)	3	PPS UID	UI	1
Detector ARC Gain	(0011,1015)	3	Detector ARC Gain	DS	1
Processing Debug Info	(0011,1016)	3	Processing Debug Info	LT	1
Override Mode	(0011,1017)	3	Override Mode	CS	1
Overlay IOR	(0011,1018)	3	Overlay IOR	LT	1
Film Speed Selection	(0011,1019)	3	Film Speed Selection	DS	1
Detected Field of View	(0011,1031)	3	Actual Collimator FOV	IS	2-n
Adjusted Field of View	(0011,1032)	3	Output of ICED algorithm. Value from user manual adjustment. Note: When the collimator is rotated, the stored vertices are those of the rectangle circumscribing the polygonal collimator.	IS	2-n
Detector Exposure Index	(0011,1033)	3	Detector Exposure Index	DS	1
Compensated Detector Exposure	(0011,1034)	3	Compensated Detector Exposure	DS	1
Uncompensated Detector Exposure	(0011,1035)	3	Uncompensated Detector Exposure	DS	1
Median Anatomy count value	(0011,1036)	3	Median Anatomy count value	DS	1
DEI Lower & Upper limit values	(0011,1037)	3	DEI Lower & Upper limit values	DS	4
Shif Vector for Pasting	(0011,1038)	3	Shif Vector for Pasting	SL	2-n
Image number for Pasting	(0011,1039)	3	Image number for Pasting	CS	n
Pasting Overlap	(0011,1040)	3	Pasting Overlap	SL	1
Sub image collimator vertices	(0011,1041)	3	Sub image collimator vertices	IS	8-n
View IP	(0011,1042)	3	View IP	LO	1
Key Stone Co-ordinates	(0011,1043)	3	Key Stone Co-ordinates	IS	8-n
Receptor Type	(0011,1044)	3	Receptor Type	CS	1
Overlap Region Coordinates	(0011,1045)	3	Overlap Region Coordinates	SL	2-n

Attribute name	Tag	Type	Attribute description	VR	VM
Acquisiton Device Processing Description	(0011,1046)	3	Acquisiton Device Processing Description	LO	5
Conversion Factor	(0011,1047)	3	Calibration for a specified detector	DS	1
Focal Spot Position	(0011,1048)	3	Focal Spot Position	DS	3
Start Angle	(0011,1049)	3	Start Angle	DS	1
End Angle	(0011,1050)	3	End Angle	DS	1
Frame Rate	(0011,1051)	3	Frame Rate	DS	1
Tube Angle	(0011,1052)	3	Tube Angle	DS	1
Column Angle	(0011,1053)	3	Column Angle	DS	1
Start Height	(0011,1054)	3	Start Height	DS	1
End Height	(0011,1055)	3	End Height	DS	1
Sampling Factor	(0011,1056)	3	Sampling Factor	DS	1
SweepDirection	(0011,1057)	3	SweepDirection	CS	1
Slice Interval	(0011,1058)	3	Slice Interval	DS	1
Grid Position	(0011,1059)	3	Determines the orientation of the Grid	CS	1
WallStand Position	(0011,1060)	3	WallStand Position	CS	1
DerivedAcqType	(0011,1061)	3	DerivedAcqType	CS	1
RRAClassification	(0011,1062)	3	Only present if RRA is enabled. Only present in Presentation Images. RRA classification for repeat acquisitions, for unnecessary images for non-clinical images is filled in this tag.	LO	1
RRAReason	(0011,1063)	3	Only present if RRA is enabled. Only present in Presentation Images. Values consists of reason for repeat acquisition.	LO	1
DetectorType	(0011,1064)	3	Type of detector used during exposure	LO	1
DerivedReceptorType	(0011,1065)	3	DerivedReceptorType	LO	1
ExtensionCableInUse	(0011,1066)	3	Indicates if the extension cable was in use	SH	1
DetectorPortInUse	(0011,1067)	3	Table port in use	SH	1
MacAddress	(0011,1068)	3	Detector Mac Address	LO	1
DetectorHeightCorrection	(0011,1069)	3	Distance from Detector to the Table/WS patient barrier. This tag is only used for the Tomo Recon feature and Image Pasting.	DS	1
DetectorPanelType	(0011,106A)	3	Detector Panel Type	CS	1
DefaultNormalLUT	(0011,106B)	3	LUT for JEG conversion. Only present in Presentation Images.	OW	n
UncompensatedSensitivity	(0011,106D)	3	Is defined as the conversion efficiency of the detector	DS	1
EMI Applied	(0011,1070)	3	EMI Applied	CS	1
EMI Configurations	(0011,1071)	3	EMI Configurations	LT	1
EMI Correction Data	(0011,1072)	3	EMI Correction Data	LT	1
Deviation Index	(0011,1073)	3	Deviation Index	DS	1
Exposure Index	(0011,1074)	3	Exposure Index	DS	1
Target Exposure Index	(0011,1075)	3	Target Exposure Index	DS	1
Patient Orientation Original Value	(0011,1076)	3	Patient Orientation Original Value	CS	2
Fast Preview Quantifications Sufficient Value	(0011,1077)	3	Fast Preview Quantifications Sufficient Value	CS	2

Attribute name	Tag	Type	Attribute description	VR	VM
Fast Preview Final Min Value	(0011,1078)	3	Fast Preview Final Min Value	DS	2
Fast Preview Final Max Value	(0011,1079)	3	Fast Preview Final Max Value	DS	2
Fast Preview R1 Value	(0011,107A)	3	Fast Preview R1 Value	SS	2
Fast Preview R2 Value	(0011,107B)	3	Fast Preview R2 Value	SS	2
Fast Preview Sign Changed	(0011,107C)	3	Fast Preview Sign Changed	CS	2
Grid Line Reduction Applied	(0011,107D)	3	Grid Line Reduction Applied	CS	1
Detector Orientation	(0011,107E)	3	Detector Orientation	DS	1
DEIStatus	(0011,1080)	3	DEIStatus	IS	1
View Name for DX Image	(0011,1081)	3	View Name for DX Image	LO	1
Grid Freq	(0011,1082)	3	Grid Freq	LO	1
r_offsetIOR	(0011,1083)	3	r_offsetIOR	LO	1
Pasting COI	(0011,1084)		COI Information for Pasting. Filled only in case Image Pasting		
Pasting Patient Barrier Distance	(0011,1085)		Patient Barrier Distance. Filled only in case Image Pasting		
Detector Direction	(0011,10A1)	3	Detector Direction	CS	1
AutoGrid Strength	(0011,10A2)	3	AutoGrid Strength	SH	1
Grid Recommended	(0011,10A3)	3	Grid Recommended	SH	1
Image Initial Rows	(0011,10A4)	3	Image Initial Rows	US	1
Image Initial Columns	(0011,10A5)	3	Image Initial Columns	US	1
MAR Status	(0011,10A9)	3	MAR Status	CS	1
LCE Setting In IP Looks	(0011,10AA)	3	LCE Setting In IP Looks	SH	1
Rotation Angle Context	(0011,10AB)	3	Rotation Angle Context	ST	1
Initial Window Width	(0011,10B9)	3	Initial Window Width	DS	1-n
Initial Window Center	(0011,10BA)	3	Initial Window Center	DS	1-n
Pre Final Window Width	(0011,10BB)	3	Pre Final Window Width	DS	1-n
Pre Final Window Center	(0011,10BC)	3	Pre Final Window Center	DS	1-n
AI Inferencing Engine Output	(0011,10BD)	3	AI Inferencing Engine Output	LT	1
Brighness Adjustment	(0011,10BE)	3	Brighness Adjustment	DS	1-n
Contrast Adjustment	(0011,10BF)	3	Contrast Adjustment	DS	1-n
Brighness AI	(0011,10C0)	3	Brighness AI	DS	1-n
Contrast AI	(0011,10C1)	3	Contrast AI	DS	1-n
Brighness Deviation	(0011,10C2)	3	Brighness Deviation	DS	1-n
Contrast Deviation	(0011,10C3)	3	Contrast Deviation	DS	1-n
Final Iteration Count	(0011,10C4)	3	Final Iteration Count	DS	1-n
Study Dose	(0011,10C7)	3	Study Dose	DS	1
Study DAP	(0011,10C8)	3	Study DAP	DS	1
NonDigital Exposures	(0011,10C9)	3	NonDigital Exposures	IS	1
Total Exposures	(0011,10CA)	3	Total Exposures	IS	1
DPNR Stength value	(0011,10D0)	3	DPNR strength value	SH	1
DPNR snrComputation number	(0011,10D1)	3	DPNR snr computation number	IS	1
DPNR Lamda Value	(0011,10D2)	3	DPNR lamda value	DS	1

Attribute name	Tag	Type	Attribute description	VR	VM
DPNR snrCoeff slop and intercept	(0011,10D3)	3	DPNR snr coefficient slope and intercept	DS	2
Last User Action	(0011,10D4)	3	Last user action of rotate and flip of image	LO	1
MR Edge number	(0011,10D5)	3	MR Edge number	DS	1
Patient Position dicom snapshot UID	(0011,10E0)	3	Patient Position dicom snapshot UID	UI	1
Patient Position dicom snapshot Series UID	(0011,10E1)	3	Patient Position dicom snapshot Series UID	UI	1
Source to Surface Distance	(0011,10E2)	3	Source to Surface Distance	DS	1
Caliper Measurement	(0011,10E3)	3	Caliper Measurement	DS	1
Suggested Habitus	(0011,10E4)	3	Suggested Habitus	SS	1
Selected Patient Size	(0011,10E5)	3	Selected Patient Size	SS	1
Configure Suggest (Related Patient size range)	(0011,10E6)	3	Configure Suggest (Related Patient size range)	SS	1

Table 4-28 Private creator identification - Private Creator GEMS_GDXE_RAD_PRODUCT

Attribute name	Tag	Type	Attribute description	VR	VM
Private Creator	(0045,0010)	1	GEMS_GDXE_RAD_PRODUCT	LO	1
A_COEFFICIENTS	(0045,1055)	3	A_COEFFICIENTS	DS	8
USER_WINDOW_CENTER	(0045,1062)	3	USER_WINDOW_CENTER	IS	1
USER_WINDOW_WIDTH	(0045,1063)	3	USER_WINDOW_WIDTH	IS	1
DETECTOR_ENTRANCE_DOSE	(0045,1065)	3	DETECTOR_ENTRANCE_DOSE	IS	1
ASYMMTRY_PARAMETER	(0045,1067)	3	VOI LUT Asymmetry Parameter Beta	DS	3
COLLIMATOR_ROTATION	(0045,1069)	3	COLLIMATOR_ROTATION	IS	1
FOV WIDTH	(0045,1072)	3	FOV WIDTH	IS	1
FOV LENGTH	(0045,1073)	3	FOV LENGTH	IS	1
Anatomical Position	(0045,1075)	3	Anatomical Position	CS	1
Anatomical Laterality	(0045,1077)	3	Anatomical Laterality	SH	1
Image Pasting Center of Interest	(0045,1079)	3	Image Pasting Center of Interest	CS	1
Assymetrical Collimation	(0045,1081)	3	Assymetrical Collimation	CS	1
Auto Position Selection	(0045,1083)	3	Auto Position Selection	CS	1

Table 4-29 Private creator identification - Private Creator GEMS_GDXE_AI_TAG

Attribute name	Tag	Type	Attribute description	VR	VM
Private Creator	(00A1,0010)	1	GEMS_GDXE_AI_TAG	LO	1
CCS Collective Result	(00A1,10B1)	3	CCS Collective Result	CS	1
CCS Algorithm finding	(00A1,10B2)	3	CCS Algorithm finding	LT	1
CCS Configuration parameters	(00A1,10B3)	3	CCS Configuration parameters	LT	1
Algorithms Executed	(00A1,10B4)	3	Algorithms Executed	CS	1-n

Attribute name	Tag	Type	Attribute description	VR	VM
Algorithms results	(00A1,10B5)	3	Algorithms results	CS	1-n
Confidence scores	(00A1,10B6)	3	Confidence scores	DS	1-n
Customer configured threshold	(00A1,10B7)	3	Customer configured threshold	DS	1-n
Rotation Angle	(00A1,10B8)	3	Rotation Angle	SS	1

Table 4-30 Private creator identification - Private Creator GEMS_GDXE_ATHENAV2_INTERNAL_USE

Attribute name	Tag	Type	Attribute description	VR	VM
Private Creator	(7FDF,0010)	1	GEMS_GDXE_ATHENAV2_INTERNAL_USE	LO	1
PPS Stream	(7FDF,1010)	3	Pixel Data Reference	LT	1
Pixel Data Reference (temporary)	(7FDF,1011)	3	Pixel Data Reference (temporary)	LT	1
JPEG Image reference	(7FDF,1012)	3	JPEG Image reference	LT	1
Print Image Sequence	(7FDF,1017)	3	Print Image Sequence	SQ	1
Auto Push Tag	(7FDF,1020)	3	Auto Push Tag	SS	1
Exam Status Tag	(7FDF,1025)	3	Exam Status Tag	CS	1

Chapter 5 Study Root Query/Retrieve Information Model Definition

5.1 Introduction

This section specifies the use of the DICOM Study Root Query/Retrieve model used to organize data and against which a Query/Retrieve will be performed. This section is applicable only to Definium Pace Select. The contents of this section are:

Section 5.2 Study Root information model description
Section 5.3 Study Root information model entity-relationship model
Section 5.4 Information model keys
Section 5.5 Private data dictionary

5.2 Study Root information model description

In order to serve as an SCP of the Query/Retrieve Service Class, a DICOM AE possesses information about the Attributes of a number of stored Composite Object Instances. This information is organized into well defined Query/Retrieve Information Model. The Query/Retrieve Information Model shall be a standard Query/Retrieve Information Model.

Three standard Query/Retrieve Information Models are defined in the DICOM Standard. Each Query/Retrieve Information Model is associated with a number of SOP Classes. The following hierarchical Query/Retrieve Information Models are defined:

- Patient Root
- Study Root
- Patient/Study Only

This section presents the detail of Study Root information model. The top level of Study Root Query/Retrieve Information Model is the study level. Attributes of patients are considered to be Attributes of studies:

- Study
- Series
- Composite Object Instance

5.3 Study Root information model entity-relationship model

The Entity-Relationship diagram for the Study Root information model schema is shown in Figure 5-1. In this figure, the following diagrammatic convention is established to represent the information organization:

- Each entity is represented by a rectangular box
- Each relationship is represented by a diamond shaped box.
- The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown. In other words, the relationship between Series and Image can have up to n Images per Series.

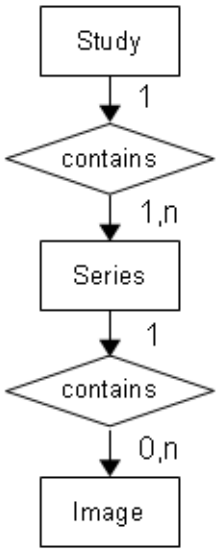


Figure 5-1 Study Root Query/Retrieve information model E/R diagram

5.3.1 Entity descriptions

Refer to DICOM Standard PS 3.4 (Service Class Specifications) for a description of each of the levels contained within the Study Root Query/Retrieve information model.

5.3.2 Definium Pace Select system mapping of DICOM entities

Table 5-1 Mapping of DICOM entities to Definium Pace Select system entities

DICOM entity	System entity
Study	Study
Series	Series
Image	Image

5.4 Information model keys

Refer to DICOM Standard PS 3.4 (Service Class Specifications) for a description of each of the levels contained within the Study Root Query/Retrieve information model.

The following Level descriptions are included to specify what data elements are supported and what type of matching can be applied. It should be noted that they are the same ones as defined in the DICOM V3.0 Standard PS 3.4 (Service Class Specifications).

5.4.1 Supported Matching

Following are the types of matching that can be requested by the implementation:

- Single Value matching
- Universal Matching

- Wild Card Matching
- Range of date, Range of Time

5.4.2 Study Level

This section defines the keys at the Study Level of the Study Root Query/Retrieve information model that are supported by this implementation.

Table 5-2 Study level attributes for the Study Root Query/Retrieve information model

Attribute name	Tag	Type	Attribute description
Study Date	(0008,0020)	R	User Filtering is possible. 1) Single value 2) Range of Date 3) Universal matching
Study Time	(0008,0030)	R	User Filtering is possible. 1) Single value 2) Range of Time 3) Universal matching
Accession Number	(0008,0050)	R	
Patient's Name	(0010,0010)	R	User Filtering is possible 1) Single value 2) Wild card 3) Universal matching
Patient ID	(0010,0020)	U	User Filtering is possible 1) Single value 2) Wild card 3) Universal matching
Study Instance UID	(0020,000D)	U	
Study ID	(0020,0010)	R	
Study Description	(0008,0930)	U	User Filtering is possible 1) Single value 2) Wild card 3) Universal matching

Table 5-3 Q/R study level and location for retrieve attributes

Attribute name	Tag	Type	Note
Query Retrieve Level	(0008,0052)	-	Value = STUDY

5.4.3 Series Level

This section defines the keys at the Series Level of the Study Root Query/Retrieve information model that are supported by this implementation.

Table 5-4 Series level attributes for the Study Root Query/retrieve information model

Attribute name	Tag	Type	Attribute description
Modality	(0008,0060)	R	User Filtering is possible 1) Single value matching. 2) Universal matching
Series Instance UID	(0020,000E)	U	
Series Number	(0020,0011)	R	

Attribute name	Tag	Type	Attribute description
Series Description	(0008,103E)	O	User Filtering is possible 1) Single value 2) Wild card 3) Universal matching

Table 5-5 Q/R series level and location for retrieve attributes

Attribute name	Tag	Type	Note
Query Retrieve Level	(0008,0052)	-	Value = SERIES

5.4.4 Image Level

This section defines the keys at the Image Level of the Study Root Query/Retrieve information model that are supported by this implementation.

Table 5-6 Image level attributes for the Study Root Query/Retrieve information model

Attribute name	Tag	Type	Attribute description
SOP Instance UID	(0008,0018)	R	
Image Number	(0020,0013)	R	

Table 5-7 Q/R image level and location for retrieve attributes

Attribute name	Tag	Type	Note
Query Retrieve Level	(008,0052)	-	Value = IMAGE

5.5 Private data dictionary

No private data dictionary is defined.

Chapter 6 Modality Worklist Information Model Definition

6.1 Introduction

This section specifies the use of the DICOM Modality Worklist information model used to organize data and against which a Modality Worklist Query will be performed. The contents of this section are:

Section 6.2 Modality Worklist information model description

Section 6.3 Modality Worklist information model entity-relationship model

Section 6.4 Information model module

Section 6.5 Information model keys

Section 6.6 Private data dictionary

6.2 Modality Worklist information model description

In order to serve as a Service Class Provider (SCP) of the Modality Worklist Service Class, a DICOM Application Entity (AE) possesses information about the attributes of a number of managed worklist items. These items are organized into Modality Worklist information modules. In this Service Class, the information model plays a role similar to an information object definition of most other DICOM Service Classes.

6.3 Modality Worklist information model entity- relationship model

The Entity-Relationship diagram for the Modality Worklist information model schema is shown in Figure 6-1. It represents the information that composes a Worklist Item. In this figure, the following diagrammatic convention is established to represent the information organization:

- Each entity is represented by a rectangular box
- Each relationship is represented by a diamond shaped box.
- The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

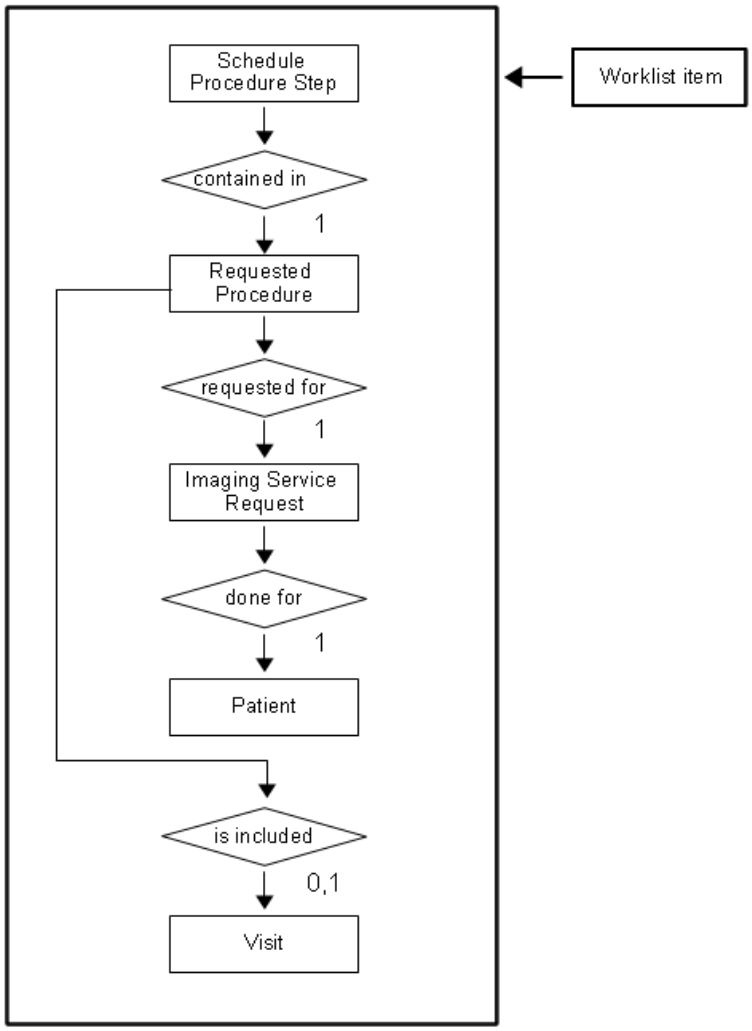


Figure 6-1 Modality Worklist information model E/R diagram

6.3.1 Entity descriptions

Refer to DICOM Standard PS 3.3 (Information object definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist information model.

6.3.1.1 Scheduled Procedure Step entity description

A Scheduled Procedure Step is an arbitrarily defined scheduled unit of service that is specified by the Procedure Plan for a Requested Procedure. It specifies one or more Protocols (events), involving equipment (i.e. imaging modality equipment), human resources, location and time (i.e. start time, stop time, duration).

6.3.1.2 Requested Procedure entity description

A Requested Procedure is an instance of a Procedure of a given Procedure Type. An instance of a Requested Procedure includes all the items of information that are specified by an instance of a Procedure Plan that is selected for the Requested Procedure by the imaging service provider.

6.3.1.3 Imaging Service Request entity description

An Imaging Service Request is a set of one or more Requested Procedures selected from a list of Procedure Types. An Imaging Service Request is submitted by one authorized imaging service requester to one authorized imaging service provider in the context of one Service Episode.

6.3.1.4 Visit entity description

A Visit is the context in which the treatment or management of an arbitrary subset of a Patient's medical

conditions occurs. A Visit is limited to the description of a Patient's activities at a single facility.

6.3.1.5 Patient entity description

A Patient is a person receiving, or registered to receive, healthcare services.

6.3.2 Definium Pace Select system mapping of DICOM entities

Table 6-1 Mapping of DICOM entities to Definium Pace Select system entities

DICOM entity	System entity
Scheduled Procedure Step	Series
Requested Procedure	Study/Exam
Imaging Service Request	Study/Exam
Visit	Study/Exam
Patient	Patient

6.4 Information model module

Within an entity of the DICOM V3.0 Modality Worklist information model, attributes are grouped into related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into data sets.

Table 6-2 identifies the defined modules within the entities that comprise the DICOM V3.0 Modality Worklist information model. Modules are identified by module name. See DICOM V3.0 PS 3.3 Information Object Definitions and PS 3.4 Service Class Specifications for complete definition of the entities, modules, and attributes.

Table 6-2 Modality Worklist information model modules

Entity name	Module name	Section reference
Scheduled Procedure Step	SOP Common	6.5.2.1 SOP Common module
	Scheduled Procedure Step	6.5.2.2 Scheduled Procedure Step module
Requested Procedure	Requested Procedure	6.5.3.1 Requested Procedure module
Imaging Service Request	Imaging Service Request	6.5.4.1 Imaging Service Request module
Visit	Visit Identification	6.5.5.1 Visit Identification module
	Visit Status	6.5.5.2 Visit Status module
	Visit Relationship	6.5.5.3 Visit Relationship module
	Visit Admission	6.5.5.4 Visit Admission module
Patient	Patient Relationship	6.5.6.1 Patient Relationship module
	Patient Identification	6.5.6.2 Patient Identification module
	Patient Demographic	6.5.6.3 Patient Demographic module
	Patient Medical	6.5.6.4 Patient Medical module

6.5 Information model keys

Refer to DICOM Standard PS 3.3 (Information Object Definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist information model.

The following module descriptions are included to specify what data elements are supported and what type of matching can be applied. It should be noted that they are the same ones as defined in the DICOM V3.0 Standard PS 3.4 (Service Class Specifications) and include:

- Name
- Tag group and element numbers
- Expected matching key type: R-required, O-optional
- Expected Return Key Type:
  - 1 - non-zero value required
  - 1C - conditionally of type 1
  - 2 - required to be present, possibly with zero-length value
  - 2C - conditionally of type 2
  - 3 - optional
- Mapped into image/MPPS – whether this data is mapped into subsequently acquired images/MPPS
- Notes - clarification of this implementation's use/treatment of this attribute

All data elements in the following module descriptions are requested by default by the Worklist Server AE.

Data elements for which values can be sent for matching purposes are described as such. Data elements for which values are Not sent are sent with zero length and universal matching will apply. This is the default case if no other description to the contrary is provided.

6.5.1 Supported matching

Following are the types of matching that can be request by the implementation:

- Single Value matching
- Universal Matching
- Range of date, Range of Time

6.5.2 Scheduled Procedure Step entity

6.5.2.1 SOP Common module

Table 6-3 SOP Common module attributes

Attribute name	Tag	Expected matching key type	Expected returned key type	Mapped into image/ MPPS	Displayed to user	Updatable by user	Note
Specific Character Set	(0008, 0005)	O	1C	No/Yes	No	No	This value is always sent and is one of the entries listed in Section 4.1

6.5.2.2 Scheduled Procedure Step module

Table 6-4 Scheduled Procedure Step module attributes

Attribute name	Tag	Expected matching key type	Expected returned key type	Mapped into image/ MPPS	Displayed to user	Updatable by user	Note
Scheduled Procedure Step Sequence	(0040, 0100)	R	1	No/No	N/A	N/A	
>Scheduled Station AE Title	(0040, 0001)	R	1	No/No	No	No	Matching is supported as follows: either no AE title is supplied (universal matching), or the Query AE title is supplied for matching; this is user selectable.
>Scheduled Procedure Step Start Date	(0040, 0002)	R	1	No/No	Yes	No	Matching is supported as one of the following rules. This is user selectable: • today only, • tomorrow only, • from date1 to date2, date1 and date2 being defined by user Returned values must be exactly 8 numeric characters, in YYYYMMDD or YYYY/MM/DD format
> Scheduled Procedure Step Start Time	(0040, 0003)	R	1	No/No	Yes	No	Added if provided by RIS
>Modality	(0008, 0060)	R	1	Yes/No	Yes	No	Matching is supported as follows: either no Modality is supplied (universal matching), or the system's Modality is supplied (i.e. DX) for matching: this is user selectable.
>Scheduled Performing Physician's Name	(0040, 0006)	R	2	Yes/No	Yes	Yes	Added if provided by RIS
>Scheduled Procedure Step Description	(0040, 0007)	O	1C	Yes/No	Yes	Yes	Added if provided by RIS
>Scheduled Protocol Code Sequence	(0040, 0008)	O	1C	Yes/No	No	No	Added if provided by RIS

Attribute name	Tag	Expected matching key type	Expected returned key type	Mapped into image/ MPPS	Displayed to user	Updatable by user	Note
>>Code Value	(0008, 0100)	O	1C	Yes/No	No	No	Added if provided by RIS
>>Coding Scheme Designator	(0008, 0102)	O	1C	Yes/No	No	No	Added if provided by RIS
>>Code Meaning	(0008, 0104)	O	3	Yes/No	No	No	Added if provided by RIS
>Scheduled Procedure Step ID	(0040, 0009)	O	1	Yes/No	No	No	Added if provided by RIS

6.5.3 Requested Procedure entity

6.5.3.1 Requested Procedure module

Table 6-5 Requested Procedure module attributes

Attribute name	Tag	Expected matching key type	Expected returned key type	Mapped into image/ MPPS	Displayed to user	Updatable by user	Note
Requested Procedure ID	(0040,1001)	O	1	Yes/Yes	Yes	No	
Requested Procedure Description	(0032,1060)	O	1C	Yes/Yes	Yes	Yes	Copied to study description (0008,1030) if provided by RIS.
Requested Procedure Code Sequence	(0032,1064)	O	1C	Yes/Yes	No	No	Default Auto Protocol Assist sequence.
>Code Value	(0008,0100)	O	1C	Yes/Yes	No	No	
>Coding Scheme Designator	(0008,0102)	O	1C	Yes/Yes	No	No	
>Code Meaning	(0008,0104)	O	3	Yes/Yes	No	No	
Study Instance UID	(0020,000D)	O	1	Yes/Yes	No	No	
Referenced Study Sequence	(0008,1110)	O	2	Yes/Yes	No	No	
>Referenced SOP Class UID	(0008,1150)	O	1C	Yes/Yes	No	No	
>Referenced SOP Instance UID	(0008,1155)	O	1C	Yes/Yes	No	No	

6.5.4 Imaging Service Request entity

6.5.4.1 Imaging Service Request module

Table 6-6 Imaging Service Request module attributes

Attribute name	Tag	Expected matching key type	Expected returned key type	Mapped into image/ MPPS	Displayed to user	Updatable by user	Note
Accession Number	(0008,0050)	O	2	Yes/Yes	Yes	Yes, if not provided by HIS	
Referring Physician Name	(0008,0090)	O	2	Yes/No	Yes	Yes	Mapped in image to same tag

6.5.5 Visit entity

6.5.5.1 Visit Identification module

None of the data element from Visit Identification module are requested.

6.5.5.2 Visit Status module

None of the data element from Visit Status module are requested.

6.5.5.3 Visit Relationship module

Table 6-7 Visit Relationship module attributes

Attribute name	Tag	Expected matching key type	Expected returned key type	Mapped into image/MPPS	Displayed to user	Updatable by user	Note
Referenced Patient Sequence	(0008,1120)	O	2	Yes/Yes	No	No	
>Referenced SOPClass UID	(0008,1150)	O	2	Yes/Yes	No	No	
>Referenced SOP Instance UID	(0008,1155)	O	2	Yes/Yes	No	No	

6.5.5.4 Visit Admission module

None of the data elements from Visit Admission module are requested.

6.5.6 Patient entity

6.5.6.1 Patient Relationship module

None of the data elements from Patient Relationship module are requested.

6.5.6.2 Patient Identification module

Table 6-8 Patient Identification module attributes

Attribute name	Tag	Expected matching key type	Expected returned key type	Mapped into image/ MPPS	Displayed to user	Updatable by user	Note
Patient's Name	(0010, 0010)	R	1	Yes/Yes	Yes	Yes, if not provided by HIS	Matching is supported as follows: either no patient name is supplied (universal matching), or the Patient Name entered by the user in the Query Definition screen is supplied for matching. System adds ^ automatically for patient name fields. It is entered in LastName FirstName MiddleName format.
Patient ID	(0010, 0020)	R	1	Yes/Yes	Yes	Yes, if not provided by HIS	Matching is supported as follows: either no patient ID is supplied (universal matching), or the patient ID entered by the user in the Query Definition screen is supplied for matching.
Other Patient ID	(0010, 1000)	O	3	Yes/Yes	No	No	
Other Patient Names	(0010, 1001)	O	3	Yes/Yes	No	No	
Other Patient IDs Sequence	(0010, 1002)	O	3	Yes/Yes	No	No	

6.5.6.3 Patient Demographic module

Table 6-9 Patient Demographic module attributes

Attribute name	Tag	Expected matching key type	Expected returned key type	Mapped into image/MPPS	Displayed to user	Updatable by user	Note
Patient Birth Date	(0010,0030)	O	2	Yes/Yes	Yes	Yes	
Patient's Sex	(0010,0040)	O	2	Yes/Yes	Yes	Yes	

Attribute name	Tag	Expected matching key type	Expected returned key type	Mapped into image/MPPS	Displayed to user	Updatable by user	Note
Patient Age	(0010,1010)	O	2	Yes/Yes	Yes	Yes	
Patient's Size	(0010,1020)	O	2	Yes/Yes	No	No	
Patient's Weight	(0010,1030)	O	3	Yes/Yes	No	No	
Patient Comments	(0010,4000)	O	3	Yes/No	No	No	

6.5.6.4 Patient Medical module

None of the data elements from Patient Medical module are requested.

6.6 Private data dictionary

The Definium Pace Select system implementation does not define any private attributes within the Modality Worklist information model.

Chapter 7 Print Management SOP Class Definition

7.1 Introduction

This section of the DICOM Conformance Statement specifies the implementation for the specific SOP Classes supported in the Basic Grayscale Print Management Meta SOP Class, the attributes supported for both IODs and services, and the valid range of values for mandatory and optional attributes.

This section contains:

Section 7.2 Basic Film Session SOP Class

Section 7.3 Basic Film Box SOP Class

Section 7.4 BASIC GRAYSCALE AND COLOR IMAGE BOX SOP CLASSES

Section 7.5 PRINTER SOP CLASS

Section 7.6 PRESENTATION LUT SOP CLASS

Section 7.7 BASIC ANNOTATION BOX SOP CLASS

Section 7.8 PRINT JOB SOP CLASS

7.2 Basic Film Session SOP Class

7.2.1 Basic Film Session N-Create

The N-CREATE is used to create an instance of the Basic Film Session SOP Class.

7.2.1.1 List of Attributes

The Table 7.1 lists the attributes that are sent in the Basic Film Session N-Create Request.

Table 7-1 Basic Film Session N-Create Request

Attribute name	Tag	Attribute description
Number of Copies	(2000,0010)	1 to 10 when using Scrapbook Print. 1 to 9 when using Standard Print.
Print Priority	(2000,0020)	LOW
Medium Type	(2000,0030)	Set to one of following based on configuration: PAPER FILM, CLEAR FILM, or BLUE FILM.
Film Destination	(2000,0040)	Set to one of following based on configuration: MAGAZINE, or PROCESSOR
Film Session Label	(2000,0050)	Print_Sess
Memory Allocation	(2000,0060)	Not sent

7.2.1.2 Status

Table below lists the status codes values that may be returned in a N-CREATE response for Basic Film Session SOP Class.

Service status	Status codes	Further meaning	Application behavior when receiving status codes
Warning	B600	Memory allocation not supported	Association is aborted
Success	0000	Film session successfully created	Next step described in the sequencing of real- world activities paragraph is performed
Warning	0107	Attribute List Error	
Warning	0116	Attribute Value Out of Range	
Failure	Any error code other than above.	Print Job failure	Association is aborted. Print job is failed. User is notified with job failed message. User can retry the job from job manager.

7.2.1.3 Behavior

No specific behavior

7.3 Basic Film Box SOP Class

7.3.1 Basic Film Box N-Create

7.3.1.1 List of Attributes

This table lists the attributes that are sent to the SCP in the Basic Film Box N-Create Request, and that are received in the Basic Film Box N-Create Response from the SCP.

Attribute name	Tag	Attribute description
Image Display Format	(2010,0010)	Set to one of following based on configuration: STANDARD\1,1 STANDARD\1,2 STANDARD\2,1 STANDARD\2,2
Referenced Film Session Sequence	(2010,0500)	Single item.
>Referenced SOP Class UID	(0008,1150)	1.2.840.10008.5.1.1.1
>Referenced SOP Instance UID	(0008,1155)	Instance of SOP Class UID.
Referenced Image Box Sequence	(2010,0510)	Single Item
>Referenced SOP Class UID	(0008,1150)	1.2.840.10008.5.1.1.4
>Referenced SOP Instance UID	(0008,1155)	Instance of SOP Class UID.
Referenced Basic Annotation Box Sequence	(2010,0520)	Ignored when received from SCP
>Referenced SOP Class UID	(0008,1150)	Ignored when received from SCP

Attribute name	Tag	Attribute description
>Referenced SOP Instance UID	(0008,1155)	Ignored when received from SCP
Film Orientation	(2010,0040)	Set to one of following based on configuration: PORTRAIT LANDSCAPE
Film Size ID	(2010,0050)	Set to one of following based on configuration: 8INX10IN 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM
Magnification Type	(2010,0060)	Set to one of following based on configuration: REPLICATE BILINEAR CUBIC NONE
Min Density	(2010,0120)	-1 by default or set to positive integer.
Max Density	(2010,0130)	-1 by default or set to positive integer.
Configuration Information	(2010,0150)	Empty by default, or set to a value defined when printer is declared.
Referenced Presentation LUT Sequence	(2050,0500)	Not sent.
>Referenced SOP Class UID	(0008,1150)	Not sent.
>Referenced SOP Instance UID	(0008,1155)	Not sent.
Annotation Display Format ID	(2010,0030)	Not sent
Smoothing Type	(2010,0080)	Only valid for Magnification type = CUBIC
Border Density	(2010,0100)	BLACK
Empty Image Density	(2010,0110)	Not sent.
Trim	(2010,0140)	Yes or No
Illumination	(2010,015E)	Not sent
Reflected Ambient Light	(2010,0160)	Not sent
Requested Resolution ID	(2020,0050)	Not sent
ICC Profile	(0028,2000)	Not sent

7.3.1.2 Status

Table below lists the status codes values that may be returned in a N-CREATE response of Basic Film Box SOP

Class.

Service status	Status codes	Further meaning	Application behavior when receiving status codes
Success	0000	Film session successfully created	Next step described in the sequencing of real- world activities paragraph is performed.
Failure	C616	There is an existing Film Box that has not been printed and N-ACTION at the Film Session level is not supported. A new Film Box will not be created when a previous Film Box has not been printed.	Association is aborted, print job failed. User is notified with job failed message. User can retry the job from job manager.
Warning	B605	Min/Max Density out-range. The printer will use its respective minimum or maximum density value instead.	
Warning	0116	Attribute Value Out of Range.	

7.3.1.3 Behavior

There is no specific behavior.

7.3.2 Basic Film Box N-Action

N-ACTION is used to print the current film of the film session.

7.3.2.1 List of Attributes

Following are the Action Reply arguments that are supported if present in the N-Action response of the Basic Film Box SOP Class.

Action Type Name	Action Type ID	Attribute	Tag	Usage SCU
Print	1	Referenced Print Job Sequence	(2100,0500)	Not used.
		>Referenced SOP Class UID	(0008,1150)	Not used
		>Referenced SOP Instance UID	(0008,1155)	Not used.

7.3.2.2 Status

Table below lists the status codes values that may be returned in a N-ACTION response of the Basic Film Box SOP Class.

Service status	Status codes	Further meaning	Application behavior when receiving status codes
Success	0000	Film accepted for printing.	Next step described in the sequencing of real-world activities paragraph is performed
Warning	B603	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page).	This case should not happen. This warning is considered as an error. Association is aborted.
Warning	B604	Image larger then Image Box	

Service status	Status codes	Further meaning	Application behavior when receiving status codes
Warning	B609	Image larger then Image Box	
Warning	B60A	Image larger then Image Box	
Failure	C602	Unable to create Print Job SOP Instance; print queue is full.	Appropriate message is returned to the user. Association is aborted.
	C604	Image position collision: multiple images assigned to single image position.	Appropriate message is returned to the user. Association is aborted.
	C603	Image size is larger than image box size (by using the specified magnification value).	Appropriate message is returned to the user. Association is aborted.

7.3.2.3 Behavior

SCU uses the N-ACTION to request the SCP to print one or more copies of a single film of the film session.

7.3.3 Basic Film Box N-Delete

The SCU uses the N-DELETE to request the SCP to delete the Basic Film Box SOP Instance hierarchy.

7.3.3.1 Status

Table below lists the status codes values that may be returned in a N-DELETE response of Basic Film Box SOP Class.

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Film box has been successfully deleted.
Failure	Illegal UID	0112	No such object instance: the instance UID given does not exist.

7.4 Basic Grayscale Image Box SOP Class

7.4.1 Basic Grayscale Image Box Pixel N-Set

7.4.1.1 List of Attributes

This table lists the attributes that are sent in the Basic Grayscale Image Box N-Set Request:

Attribute name	Tag	Use
Image Position	(2020,0010)	
Basic Grayscale Image Sequence	(2020,0110)	
>Samples Per Pixel	(0028,0002)	1
>Photometric Interpretation	(0028,0004)	MONOCHROME2
>Rows	(0028,0010)	Original image height
>Columns	(0028,0011)	Original image width

Attribute name	Tag	Use
>Pixel Aspect Ratio	(0028,0034)	Always 1:1
>Bits Allocated	(0028,0100)	Depends on the original image pixel depth (8 or 16).
>Bits Stored	(0028,0101)	Depends on the original image pixel depth (8 or 12 bits).
>High Bit	(0028,0102)	Depends on the original image pixel depth (7 or 11).
>Pixel Representation	(0028,0103)	0 (Unsigned integer).
>Pixel Data	(7FE0,0010)	Pixel Data.
Polarity	(2020,0020)	NORMAL = pixels shall be printed as specified by the Photometric Interpretation (0028,0004) REVERSE = pixels shall be printed with the opposite polarity as specified by the Photometric Interpretation (0028,0004)
Magnification Type	(2010,0060)	Same value as defined in the Film Box.
Smoothing Type	(2010,0080)	Same value as defined in the Film Box.
Min Density	(2010,0120)	Same value as defined in the Film Box.
Max Density	(2010,0130)	Same value as defined in the Film Box.
Configuration Information	(2010,0150)	Same value as defined in the Film Box.
Requested Image Size	(2020,0030)	Not sent.
Requested Decimate/Crop Behavior	(2020,0040)	Not sent.
Referenced Presentation LUT Sequence	(2050,0500)	Not sent.
> Referenced SOP Class UID	(0008,1150)	Not sent.
> Referenced SOP Instance UID	(0008,1155)	Not sent

7.4.1.2 Status

Table below lists the status codes values that may be returned in a N-SET response of Basic Film Box SOP Class.

Service status	Status codes	Further meaning	Application behavior when receiving status codes
Failure	C605	Insufficient memory in printer to store the image	Appropriate message is returned to the user. Association is aborted.
Warning	0116	Attribute out of range	
Warning	B604	Image larger than image box	
Warning	B609	Image larger than image box	
Warning	B60A	Image larger than image box	

7.4.1.3 Behavior

There is no specific behavior.

The SCU does not instruct the SCP to erase the image in the image position by setting a zero length and no

value in the Attribute Preformatted Grayscale Image Sequence (2020,0110) or Preformatted Grayscale Image Sequence (2020,0111).

7.5 Printer SOP Class

7.5.1 Printer N-Event-Report Attributes

The table below describes the product behavior when receiving a N-Event-Report request from the Printer SCP depending on the Event Type ID value.

Event Type Name	Event Type ID	Attribute	Tag	Use
Normal	1			Activity is continued.
Warning	2	Printer Status Info	(2110,0020)	Association is released except if Printer Status Info is SUPPLY LOW or SUPPLY EMPTY
		Film Destination	(2000,0040)	Not used
		Printer Name	(2110,0030)	Not used
Failure	3	Printer Status Info	(2110,0020)	Association is aborted & user is notified with appropriate message.
		Film Destination	(2000,0040)	Not used.
		Printer Name	(2110,0030)	Not used.

Status code returned as part of the response for N-EVENT-REPORT request is 0000 (Success) when reading request message is successful. No response is sent to SCP when there is failure in reading the N-EVENT-REPORT request.

7.5.2 Printer N-Get Attributes

This table defines the set of attributes that this product may request using the Printer N-Get service. It also describes what is the product behavior when receiving the N-Get response from the Printer SCP.

Attribute Name	Tag	Use
Printer Status	(2110,0010)	NORMAL: Activity is continued. WARNING: See below row. FAILURE: Association is aborted.
Printer Status Info	(2110,0020)	Association is released except if Printer Status Info is SUPPLY LOW or SUPPLY EMPTY
Printer Name	(2110,0030)	Not used from SCP response.
Manufacturer	(0008,0070)	Not used from SCP response.
Manufacturer Model Name	(0008,1090)	Not used from SCP response.
Device Serial Number	(0018,1000)	Not used from SCP response.
Software Versions	(0018,1020)	Not used from SCP response.

Date Of Last Calibration	(0018,1200)	Not used from SCP response.
Time Of Last Calibration	(0018,1201)	Not used from SCP response.

7.5.2.1 N-Get Status

Table below lists the status codes values that may be returned in a N-GET response of Printer SOP Class from the printer SCP.

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The request to get printer status information was success.
Warning	Warning	0107	
Error	Failure	Any other status code.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

7.6 Presentation LUT SOP Class

Not used.

7.7 Basic Annotation Box SOP Class

Not used.

7.8 Print Job SOP Class

Not used.

Chapter 8 Storage Commitment Push Model SOP Class Definition

8.1 Introduction

This section of the DICOM Conformance Statement specifies the Storage Commitment Push Model SOP class, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behavior.

8.2 Storage commitment push model SOP class definition

8.2.1 IOD description

8.2.1.1 Storage commitment module

Table 8-1 Storage commitment module

Attribute name	Tag	Attribute description
Retrieve AE Title	(0008,0054)	When received in N-EVENT-REPORT, it is supported but ignored.
Transaction UID	(0008,1195)	
Storage Media File-Set ID	(0088,0130)	When received in N-EVENT-REPORT, it is supported but ignored.
Storage Media File-Set UID	(0088,0140)	When received in N-EVENT-REPORT, it is supported but ignored.
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
>Retrieve AE Title	(0008,0054)	Supported but ignored.
>Storage Media File-Set ID	(0088,0130)	Supported but ignored.
>Storage Media File-Set UID	(0088,0140)	Supported but ignored.
Referenced Study Component Sequence	(0008,1111)	Not sent.
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Failed SOP Sequence	(0008,1198)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
>Failure Reason	(0008,1197)	All values from the following table are supported.

Table 8-2 Failure reason values and semantics

Failure reason	Meaning	SCU behavior
0110H	Processing failure	Logged into log file. Pop-up Displayed to user to warn him that images from patient X could not be committed.
0112H	No such object instance	Logged into log file. Pop-up Displayed to user to warn him that images from patient X could not be committed.
0213H	Resource limitation	Logged into log file. Pop-up Displayed to user to warn him that images from patient X could not be committed.
0122H	Referenced SOP class not supported	Logged into log file. Pop-up Displayed to user to warn him that images from patient X could not be committed.
0119H	Class/Instance conflict	Logged into log file. Pop-up Displayed to user to warn him that images from patient X could not be committed.
0131H	Duplicate transaction UID	Logged into log file. Pop-up Displayed to user to warn him that images from patient X could not be committed.

8.2.2 DIMSE service group

DIMSE service element	Usage SCU/SCP
N-EVENT-REPORT	M/M
N-ACTION	M/M

8.2.3 Operations

8.2.3.1 Action information

Table 8-3 Storage commitment request - action information

Action type name	Action type ID	Attribute	Tag	Requirement type SCU/SCP
Request Storage Commitment	1	Transaction UID	(0008,1195)	1/1
		Referenced SOP Sequence	(0008,1199)	1/1
		>Referenced SOP class UID	(0008,1150)	1/1
		>Referenced SOP Instance UID	(0008,1155)	1/1

8.2.3.2 Service class user behavior

N-ACTION is sent when the images are successfully sent to a remote host declared as Storage Commitment Provider on the Definium Pace Select system.

Storage Commitment can be requested for Digital X-Ray SOP class Images For Presentation and For Processing.

Storage Commitment is never requested for images sent to remote host with CR Fallback (see definition in Chapter 2 Network conformance statement).

Referenced Study Component Sequence attribute is not supported.

The transaction UID is applicable until the N-EVENT-REPORT is received. Storage Media File-Set ID and UID attributes in the N-ACTION are not supported.

When receiving an unsuccessful N-ACTION Response Status Code from the SCP, the system logs the error in a log file, and display a pop-up to the user.

8.2.3.3 Status codes

No Service Class specific status values are defined for the N-ACTION Service. See PS 3.7 for general response Status codes.

8.2.4 Notifications

8.2.4.1 Event Information

Table 8-4 Storage commitment result - event information

Event type name	Event type ID	Attribute	Tag	Requirement type SCU/SCP
Storage Commitment Request Successful	1	Transaction UID	(0008,1195)	-/1
		Referenced SOP Sequence	(0008,1199)	-/1
		>Referenced SOP class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
Storage Commitment Request Complete -Failures Exist	2	Transaction UID	(0008,1195)	-/1
		Referenced SOP Sequence	(0008,1199)	-/1C
		>Referenced SOP class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		Failed SOP Sequence	(0008,1198)	-/1
		>Referenced SOP class UID	(0008,1150)	-/1
		>Referenced SOP Instance UID	(0008,1155)	-/1
		>Failure Reason	(0008,1197)	-/1

8.2.4.2 Service class user behavior

When receiving the N-EVENT-REPORT, system looks first for the SOP Instance UID successfully committed. It records them in a log file and flags them in the local database as “Committed”.

Secondly, the system looks for the SOP Instance UID for which the commit failed. It also records them in a log file with the failure reason and display a pop-up to the user.

8.2.4.3 Status codes

No Service Class specific status values are defined for the N-EVENT-REPORT Service.

Service status	Status codes	Further meaning	Application behavior when receiving status codes
SUCCESS	0000H	Success	System shows storage commitment icon on Image management screen.
FAILURE	119H	Class-Instance Conflict	System doesn't show storage commitment icon on Image management screen.
FAILURE	210H	Duplicate Invocation	System doesn't show storage commitment icon on Image management screen.
FAILURE	115H	Invalid Argument Value	System doesn't show storage commitment icon on Image management screen.
FAILURE	212H	Mistyped Argument	System doesn't show storage commitment icon on Image management screen.
FAILURE	114H	No Such Argument	System doesn't show storage commitment icon on Image management screen.
FAILURE	113H	No Such Event Type	System doesn't show storage commitment icon on Image management screen.
FAILURE	118H	No Such SOP Class	System doesn't show storage commitment icon on Image management screen.
FAILURE	112H	No Such SOP Instance	System doesn't show storage commitment icon on Image management screen.
FAILURE	110H	Processing Failure	System doesn't show storage commitment icon on Image management screen.
FAILURE	213H	Resource Limitation	System doesn't show storage commitment icon on Image management screen.
FAILURE	211H	Unrecognized Operation	System doesn't show storage commitment icon on Image management screen.
FAILURE	122H	SOP Class not supported	System doesn't show storage commitment icon on Image management screen.
FAILURE	131H	Duplicate transaction UID	System doesn't show storage commitment icon on Image management screen.

Chapter 9 Modality Performed Procedure Step Implementation

9.1 Introduction

This section specifies the use of the DICOM Modality Performed Procedure Step information to be communicated to the Hospital/Radiology information system.

This feature works in conjunction with DICOM Modality Worklist feature, if installed. However, the conformance of this feature is independent of Modality Worklist feature. For information on conformance of Modality Worklist feature to DICOM standard please refer to the appropriate section in this document.

9.2 Relationship between Scheduled Procedure Steps and Performed Procedure Steps

This system supports MPPS for both scheduled and unscheduled worklists. In case of scheduled entries information will be copied from SPS and incase of unscheduled entries MPPS will be filled with system generated values. SPS & PPS relationship is captured in below table.

SL NO	Relationship Type (SPS to PPS)	Other names	Explanations
1	One to One	Simple Case	One to One Matching. One SPS from MWL data results into one PPS.
2	One to Multiple	Append Case	One SPS to Multiple PPS. User takes acquisition for one SPS and then appends the required procedures to it.
3	Zero to One	Unscheduled case or Acquisition without MWL Data	Zero SPS to One PPS. This acquisition is taken without MWL data. This has two cases 1) Local case: Exam related information as defined in below note is entered by user. 2) Emergency case: Exam related as defined in the below note is auto generated by system.
4	Zero to Multiple	Append for Unscheduled case	Zero SPS to Multiple PPS. User takes one or more acquisition over and above unscheduled case. For every append case one pps is sent to MPPS server.
5	Multiple to One	Group Case	Group case is not supported on this system.

Note 1: Following table describes tags which are user entered or system generated during local exam and emergency exam.

Table 9-1 Tag Availability criteria

Attribute name	Tag	Local Exam	Emergency Exam	Remarks
Patient name	(0010,0010)	User Entered	System Generated. Current Date & time up to seconds	

Attribute name	Tag	Local Exam	Emergency Exam	Remarks
Patient ID	(0010,0020)	User Entered	System Generated. **NEW PATIENT ID**	
Patient Birth Date	(0010,0030)	User Entered	Not added	
Patient's Sex	(0010,0040)	User Entered	Not added.	
Age	(0010,1010)	User Entered	Not added.	
Study Description	(0008,1030)	User Entered	Empty value.	
Study ID	(0020,0010)	User Entered	System Generated	
Accession Number	(0008,0050)	User Entered	System generated as current date & time	
Operator	(0008,1070)	User Entered	Default operator name configured from utilities.	
Performing Physician	(0008,1050)	User Entered	System generated as ^^^^	
Referring Physician	(0008,0090)	User Entered	System generated as ^^^^	

9.3 Modality Performed Procedure Step modules

See DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

Table 9-2 Modality Performed Procedure Step modules

Module name	Section reference
SOP Common	9.4.1 SOP Common module
Performed Procedure Step Relationship	9.4.2 Performed Procedure Step Relationship module
Performed Procedure Step Information	9.4.3 Performed Procedure Step information module
Image Acquisition Results	9.4.4 Image Acquisition Results module
Radiation Dose	9.4.5 Radiation Dose module
Billing and Material Management Codes	Not used.

9.4 Modality performed procedure step module definitions

Refer to DICOM Standard PS 3.3 (Information object definitions) for a description of each of the attributes contained within the Modality Performed Procedure Step information object definition.

9.4.1 SOP Common module

Table 9-3 SOP Common module attributes

Attribute name	Tag	Type for SCU N- CREATE	Type for SCU N- SET	Use
Specific Character Set	(0008,0005)	1C	1C	Not used but copied into the MPPS Object

9.4.2 Performed Procedure Step Relationship module

Table 9-4 Performed Procedure Step Relationship module attributes

Attribute name	Tag	Type for SCU - N-CREATE		Type for SCU - N-SET		Use
		Acquisition without MWL Entry	Acquisition with MWL Entry	Acquisition without MWL Entry	Acquisition with MWL Entry	
Patient's Name	(0010, 0010)	2	2	-	-	Scheduled - Copied from the SPS. Unscheduled – Please see table 10-45 in Section 9.2.
Patient ID	(0010, 0020)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Please see table 10-45 in Section 9.2.
Patient's Birth Date	(0010, 0030)	2	2	-	-	Scheduled - Copied from the SPS. Unscheduled – Please see table 10-45 in Section 9.2.
Patient's Sex	(0010, 0040)	2	2	-	-	Scheduled - Copied from the SPS. Unscheduled –Please see table 10-45 in Section 9.2 .
Other Patient IDs	(0010, 1000)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty
Other Patient Names	(0010, 1001)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty
Other Patient IDs Sequence	(0010, 1002)	3	3	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty
Referenced Patient Sequence	(0008, 1120)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty
>Referenced SOP Class UID	(0008, 1150)					Scheduled- Copied from the SPS. Unscheduled – Not sent.

Attribute name	Tag	Type for SCU - N-CREATE		Type for SCU - N-SET		Use
		Acquisition without MWL Entry	Acquisition with MWL Entry	Acquisition without MWL Entry	Acquisition with MWL Entry	
>Referenced SOP Instance UID	(0008, 1155)					Scheduled- Copied from the SPS. Unscheduled – Not sent.
Scheduled Step Attributes Sequence	(0040, 0270)	1	1	-	-	Scheduled - Copied from the SPS. Unscheduled – System generated. System doesn't support multiple items. Hence, Group Case is not supported.
>Study Instance UID	(0020, 000D)	1	1	-	-	Scheduled - Copied from the SPS. Unscheduled – System generated
>Referenced Study Sequence	(0008, 1110)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty
>>Referenced SOP Class UID	(0008, 1150)	1	1	-	-	Scheduled- Copied from the SPS. Unscheduled – Not sent.
>>Referenced SOP Instance UID	(0008, 1155)	1	1	-	-	Scheduled- Copied from the SPS. Unscheduled – Not sent.
>Accession Number	(0008, 0050)	2	2	-	-	Scheduled - Copied from the SPS. Unscheduled – Please see table 10-45 in Section 9.2 .
>Requested Procedure ID	(0040, 1001)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty
>Requested Procedure Description	(0032, 1060)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty
>Requested Procedure Code Sequence	(0032, 1064)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty
>Scheduled Procedure Step ID	(0040, 0009)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty
>Scheduled Procedure Step Description	(0040, 0007)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty

Attribute name	Tag	Type for SCU - N-CREATE		Type for SCU - N-SET		Use
		Acquisition without MWL Entry	Acquisition with MWL Entry	Acquisition without MWL Entry	Acquisition with MWL Entry	
>Scheduled Protocol Code Sequence	(0040, 0008)	2	2	-	-	Scheduled- Copied from the SPS. Unscheduled - Value will be empty

9.4.3 Performed Procedure Step information module

Table 9-5 Performed Procedure Step information module attributes

Attribute name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Performed Station AE Title	(0040, 0241)	1	-	Local System AE Title
Performed Station Name	(0040, 0242)	2	-	Local Station Name as configured in Service User Interface
Performed Location	(0040, 0243)	2	-	Local System ID as configured in Service User Interface
Performed Procedure Step Start Date	(0040, 0244)	1	-	Same as Start Exam Date
Performed Procedure Step Start Time	(0040, 0245)	1	-	Same as Start Exam Time
Performed Procedure Step ID	(0040, 0253)	1	-	Created by the Acquisition System.
Performed Procedure Step End Date	(0040, 0250)	2	3	The Date when Complete PPS/Discontinue PPS is invoked from the UI.
Performed Procedure Step End Time	(0040, 0251)	2	3	The Time when Complete PPS/Discontinue PPS is invoked from the UI.
Performed Procedure Step Status	(0040, 0252)	1	3	See Note 1 at the end of this table
Performed Procedure Step Description	(0040, 0254)	2	3	Copied from SPS
Comments on the Performed Procedure Step	(0040, 0280)	3	3	
Performed Procedure Type Description	(0040, 0255)	2	3	
Procedure Code Sequence	(0008, 1032)	2	3	Not sent as part of MPPS Object
> 'Code Sequence Macro'				Not sent as part of MPPS Object

Attribute name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Performed Procedure Step Discontinuation Reason Code Sequence	(0040, 0281)	3	3	Sent when exam is Discontinued and carries discontinue reason as selected by the User on the UI. Please refer Note 3 for possible reasons.
> 'Code Sequence Macro'				

Note 1: When PPS Start (N-CREATE) message is sent, this element will have the value "IN PROGRESS".

Note 2: When PPS end (N-SET) message is sent, this element will have either "COMPLETE" or "DICONTINUED".

Note 3: if PPS end(N-SET) message has DISCONTINUED then the possible reasons codes are listed below.

Reason code	Type	Meaning
110500	DCM	Doctor cancelled procedure
110501	DCM	Equipment failure
110502	DCM	Incorrect procedure ordered
110503	DCM	Patient allergic to media/contrast
110504	DCM	Patient died
110505	DCM	Patient refused to continue procedure
110506	DCM	Patient taken for treatment or surgery
110507	DCM	Patient did not arrive
110508	DCM	Patient pregnant
110509	DCM	Change of procedure for correct charging
110510	DCM	Duplicate order
110511	DCM	Nursing unit cancel
110512	DCM	Incorrect side ordered
110513	DCM	Discontinued for unspecified reason
110514	DCM	Incorrect worklist entry selected
110515	DCM	Patient condition prevented continuing
110516	DCM	Equipment change
110500	DCM	Doctor cancelled procedure

9.4.4 Image Acquisition Results module

Table 9-6 Image Acquisition Results module attributes

Attribute name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Sent for SCU N-CREATE	Sent for SCU N-SET	Use
Modality	(0008, 0060)	1	-	Yes	-	DX
Study ID	(0020, 0010)	2	-	Yes		
Performed Protocol Code Sequence	(0040, 0260)	2	3	Empty Seq		
> 'Code Sequence Macro'						
Performed Series Sequence	(0040, 0340)	2	3	Empty	Yes	One item per series created
>Performing Physician Name	(0008, 1050)	2	2	-	Yes	Copied from SPS/UI selection
>Operator's Name	(0008, 1070)	2	2	-	Yes	Copied from SPS/UI selection
>Protocol Name	(0018, 1030)	1	1	-	Yes	Copied from SPS/UI selection
>Series Instance UID	(0020, 000E)	1	1	-	Yes	System generated UID
>Series Description	(0008, 103E)	2	2	-	Yes	Copied from SPS/UI selection
>Retrieve AE Title	(0008, 0054)	2	2	-	Yes	Local System AE Title
>Referenced Image Sequence	(0008, 1140)	2	2	-	Yes	One item per each image created within the series
>>Referenced SOP Class UID	(0008, 1150)	1	1	-	Yes	
>>Referenced SOP Instance UID	(0008, 1155)	1	1	-	Yes	
>Referenced Non-Image Composite SOP Instance Sequence	(0040, 0220)	2	2	-	Yes	Empty sequence is sent.
>>Referenced SOP Class UID	(0008, 1150)	1	1	-	-	Not sent
>>Referenced SOP Instance UID	(0008, 1155)	1	1	-	-	Not sent

9.4.5 Radiation Dose module

Table 9-7 Radiation Dose module attributes

Attribute name	Tag	Type for SCU N-CREATE	Type for SCU N-SET	Use
Anatomic Structure, Space or Region Sequence	(0008, 2229)	3	3	Not sent
> 'Code Sequence Macro'				Not sent
Total Time of Fluoroscopy	(0040, 0300)	3	3	Not sent
Total Number of Exposures	(0040, 0301)	3	3	Total number of acquisitions performed during this PPS
Distance Source to Detector (SID)	(0018, 1110)	3	3	Not sent
Distance Source to Entrance	(0040, 0306)	3	3	Not Sent
Entrance Dose	(0040, 0302)	3	3	Not sent
Entrance Dose in mGy	(0040, 8302)	3	3	Not sent
Exposed Area	(0040, 0303)	3	3	Not sent
Image Area Dose Product	(0018, 115E)	3	3	Cumulative Dose area product for the PPS, sent if DAP is enabled.
Comments on Radiation Dose	(0040, 0310)	3	3	Comments sent if the PPS includes a non-Digital acquisition
Exposure Dose Sequence	(0040, 030E)	3	3	Information carried from each source image.
>Radiation Mode	(0018, 115A)	3	3	
>kVp	(0018, 0060)	3	3	
>X-Ray Tube Current in µA	(0018, 8151)	3	3	
>Exposure Time	(0018, 1150)	3	3	
>Filter Type	(0018, 1160)	3	3	Not Sent

9.5 Standard extended and private data attributes

Not present.

9.6 Standard extended and private context groups

Not present.

Chapter 10 Security

10.1 Security

10.1.1 Application-Level Security

The system supports the secure communication with the implementation of DICOM Basic and AES TLS Secure Transport Connection Profile.

10.1.2 DICOM Basic and AES TLS Secure Transport Connection Profile

The system supports only x.509 certificates and private key. The certificate used by the product can be configured with default certificates or with custom certificates created by hospital administrator. The system does not verify the peer certificates while acting as SCP.

System uses port 2762 for secure communications, the port is not configurable.

The system uses following cipher Suites for communication:

Negotiation Order	Cipher Suites	TLS Version Supported
1	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384	TLSv1.2
2	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384	TLSv1.2
3	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	TLSv1.2
4	TLS_DHE_RSA_WITH_AES_128_GCM_SHA256	TLSv1.2
1	TLS_RSA_WITH_AES_128_CBC_SHA	TLSv1.1, TLSv1.0

10.1.3 Audit Trail Message Format Profile

The system supports the Audit Trail Message Format Profile to facilitate the detection of improper creation, access, modification, and deletion of Protected Health Information (PHI). The audit messages generated from the system may contain anonymized Patient ID to de-identifies the patient. System can send audit trail messages, but it cannot receive audit trail messages. The events that the system can detect, and reports described in Audit Trail Messages.

10.1.4 Audit Trail Message Transmission Profile – Syslog UDP/TCP

When configured, the system can forward audit trail messages to an audit repository as defined by the Audit Trail Message Transmission Profile – SYSLOG-UDP or TCP. Table 10.1 lists all the configuration parameters for forwarding audit trail messages to an audit repository.

10.1.5 Audit Trail Message Transmission Profile – Syslog TLS

When configured, the system can forward audit trail messages to an audit repository as defined by the Audit Trail Message Transmission Profile – Syslog – TLS. Syslog Configuration Parameters table lists all the configuration parameters for forwarding audit trail messages to an audit repository.

Table 10-1 Syslog Configuration Parameters

Parameter Name	Description
Host Name / IP	Host Name or IP address of the audit trail message receiver
Port Number	TCP/IP port number of the audit trail message receiver
Protocol	TCP BSD Syslog / UDP BSD Syslog / TLS BSD Syslog TCP IETF Syslog / UDP IETF Syslog / TLS IETF Syslog

Chapter 11 Radiation Dose Structured Report Information Object Implementation

11.1 Introduction

This section specifies the use of the Radiation Dose Structured Report (SR) IOD to represent the information included in RDSR IOD produced by this implementation. Corresponding attributes are conveyed using the module construct. The contents of this section are:

Section 11.2 RDSR IOD implementation

Section 11.3 RDSR entity-relationship

Section 11.4 IOD module table

Section 11.5 Information module definitions

Section 11.6 Standard, Standard Extended Templates

11.2 RDSR IOD implementation

The System maps DICOM Information Entities to local Information Entities in the product's database and user interface.

Table 11-1 Mapping OF DICOM Entities to System Entities

DICOM entity	System entity
Patient	Patient
Study	Exam
Series	Exam
Document	

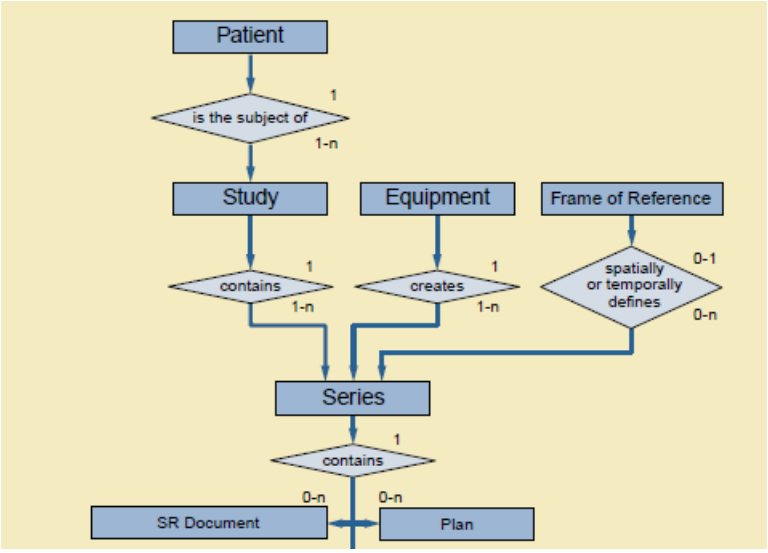
11.3 RDSR entity-relationship

The entity-relationship diagram for the RDSR interoperability schema is shown in Figure 11-1. In this figure, the following diagrammatic convention is established to represent the information organization:

- Each entity is represented by a rectangular box.
- Each relationship is represented by a diamond shaped box.
- The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

The relationships are fully defined with the maximum number of possible entities in the relationship shown. In other words, the relationship between Series and Document can have up to n documents per Series, but the Patient to Study relationship has 1 Study for each Patient (a Patient can have more than one Study on the system; however, each Study will contain all the information pertaining to that Patient).

Figure 11-1 Entity relationship diagram



11.4 IOD module table

Table 11-2 IOD Module table

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	4.6.1.1 Patient module
	Clinical Trial Subject	Not Used	N/A
Study	General Study	Used	11.5.1 General Study Module
	Patient Study	Used	11.5.2 Patient Study Module
	Clinical Trial Study	Not Used	N/A
Series	SR Document Series	Used	11.5.3.1 SR Document
	Clinical Trial Series	Not Used	N/A
Frame of Reference	Synchronization	Used	11.5.4.1 Synchronization module
Equipment	General Equipment	Used	11.5.5.1 General Equipment module
	Enhanced General Equipment	Used	11.5.5.2 Enhanced General Equipment module
Image	SR Document General	Used	11.5.6.1 SR Document General module
	SR Document Content	Used	11.5.6.2 SR Document Content module
	SOP Common	Used	11.5.6.3 SOP Common module

11.5 Information module definitions

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the SR Information Objects.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes do not present in tables are not supported.

The following Study IE modules are common to all SR IODs that reference the Study IE. These modules contain attributes of the patient and study that are needed for diagnostic interpretation of the image.

11.5.1 General Study module

This section specifies the attributes that describe and identify the Study performed upon the Patient.

Table 11-3 General Study module attributes

Attribute name	Tag	Type	Attribute description
Study Instance UID	(0020,000D)	1	From Worklist. Otherwise, internally generated.
Study Date	(0008,0020)	2	YYYYMMDD, restricted to 8 characters.
Study Time	(0008,0030)	2	HHMMSS.XXX, restricted to 10 characters.
Referring Physician's Name	(0008,0090)	2	From User Interface or worklist, restricted to 64 characters. When tag is configured for AI, value contains AI result.
Study ID	(0020,0010)	2	From User Interface or Worklist, restricted to 64 characters.
Accession Number	(0008,0050)	2	From User Interface or Worklist, restricted to 16 characters.
Study Description	(0008,1030)	3	Generated description from the worklist entries.If no value found, value is taken from user interface.
Name of Physician(s) Reading Study	(0008,1060)	3	From User Interface, restricted to 64 characters.
Referenced Study Sequence	(0008,1110)	3	From Worklist. The sequence may have 1 or more Items.
>Referenced SOP Class UID	(0008,1150)	1	From Worklist. Required if a sequence item is present.
>Referenced SOP instance UID	(0008,1155)	1	From Worklist. Required if a sequence item is present.

11.5.2 Patient Study Module

This section defines the attributes that provide information about the Patient at the time the Study started.

Table 11-4 Patient Study Module Attributes

Attribute name	Tag	Type	Attribute description
Patient's Age	(0010,1010)	3	Worklist or User Interface or Calculated from Patient's Birth Date (0010,0030). Three digits followed by one letter: In Years (Y), Months (M), Weeks (W) or Days (D). (May not be sent).

Attribute name	Tag	Type	Attribute description
Patient's Size	(0010,1020)	3	From User Interface or worklist, restricted to 16 characters. (May not be sent).
Patient's Weight	(0010,1030)	3	From User Interface or worklist, restricted to 16 characters. (May not be sent).
Admission ID	(0038,0010)	3	From Worklist, Identification number of the visit as assigned by the healthcare provider. (May not be sent)

11.5.3 Common Series entity modules

The following Series IE modules are common to all SR IODs that reference the Series IE.

11.5.3.1 SR Document Series Modules

This section defines the Attributes of the SR Document Series. A Series of SR Documents may contain any number of SR Documents.

Table 11-5 Document Series Module Attributes

Attribute name	Tag	Type	Attribute description
Modality	(0008,0060)	1	Value = SR
Series Instance UID	(0020,000E)	1	Unique identifier of the SR Series
Series Number	(0020,0011)	1	Fixed value = 997
Series Date	(0008,0021)	3	Date the Series started
Series Time	(0008,0031)	3	Time the Series started
Protocol Name	(0018,1030)	3	Description of the contents under which series was performed
Series Description	(0008,103E)	3	Value = "RADIATION DOSE INFORMATION"
Referenced Performed Procedure Step Sequence	(0008,1111)	2	Identifies the Performed Procedure Step SOP Instance in which the Series is created. Identical to the MPPS of the image series.
>Referenced SOP Class UID	(0008,1150)	1	Uniquely identifies the referenced SOP Class.
>Referenced SOP instance UID	(0008,1155)	1	Uniquely identifies the referenced SOP Instance.

11.5.4 Frame of Reference module

Specifies the Attributes necessary to uniquely identify a Frame of Reference that ensures the spatial relationship of Images within a Series. It also allows Images across multiple Series to share the same Frame of Reference. This Frame of Reference (or coordinate system) shall be constant for all Images related to a specific Frame of Reference.

Shall be present if system time is synchronized to an external reference. May be present otherwise.

11.5.4.1 Synchronization module

This section defines the Attributes of the SR Document Series. A Series of SR Documents may contain any number of SR Documents.

Table 11-6 Synchronization Module Attributes

Attribute name	Tag	Type	Attribute description
Synchronization Frame of Reference UI	(0020,0200)	1	UID of common synchronization environment. May not be present.
Synchronization Trigger	(0018,106A)	1	If Present value will be “EXTERNAL” else absent
Acquisition Time Synchronized	(0018,1800)	1	If Present value will be “Y” else absent
Time Distribution Protocol	(0018,1802)	3	If Present value will be “NTP” else absent
NTP Source Address	(0018,1803)	3	IP Address of the NPT server if available

11.5.5 Common Equipment entity modules

The following Equipment IE Module is common to all Composite IODs that reference the Equipment IE.

11.5.5.1 General Equipment module

Specifies the Attributes that identify and describe the piece of equipment that produced a Series of Composite Instances.

Table 11-7 General Equipment Module Attributes

Attribute name	Tag	Type	Attribute description
Institution Name	(0008,0080)	3	From "Service User Interface", configured at the installation of the system.
Institution Address	(0008,0081)	3	From "Service User Interface", configured at the installation of the system. Restricted to 1024 characters.
Station Name	(0008,1010)	3	AE-title of the system

11.5.5.2 Enhanced General Equipment module

Specifies the Attributes that identify and describe the piece of equipment that produced a Series of Composite Instances.

Table 11-8 Enhanced General Equipment Module Attributes

Attribute name	Tag	Type	Attribute description
Manufacturer	(0008,0070)	1	Value = "GE HealthCare"
Manufacturer's Model Name	(0008,1090)	1	Value = “Definium Pace Select”
Device Serial Number	(0018,1000)	1	Same as the value configured for “Production Identifier”.
Software Versions	(0018,1020)	1	Application version.

11.5.6 Document entity modules

11.5.6.1 SR Document General module

The following defines the general Attributes of an SR Document Instance. These Attributes identify the SR Document and provide context for the entire document.

Table 11-9 SR Document General Module Attributes

Attribute name	Tag	Type	Attribute description
Instance Number	(0020,0013)	1	Value = “1”
Completion Flag	(0040,A491)	1	Value = COMPLETE [Complete content]
Verification Flag	(0040,A493)	1	Value = UNVERIFIED [Not attested]
Content Date	(0008,0023)	1	The date the document content creation started.
Content Time	(0008,0033)	1	The time the document content creation started.
Referenced Request Sequence	(0040,A370)	1C	Identifies Requested Procedures which are being fulfil led (completely or partially) by creation of this Docu ment. One or more items may be included
>Study Instance UID	(0020,000D)	1	Restricted to 64 characters, internally generated. Identical to Study Instance UID in General Study Module.
>Referenced Study Sequence	(0008,1110)	2	From Worklist
>>Referenced SOP Class UID	(0008,1150)	1	From Worklist. Required if a sequence item is present.
>>Referenced SOP instance UID	(0008,1155)	1	From Worklist. Required if a sequence item is present.
>Accession Number	(0008,0050)	2	From User Interface or worklist, restricted to 64 characters.
>Placer Order Number	(0040,2016)	2	EMPTY
>Filler Order Number	(0040,2017)	2	EMPTY
>Requested Procedure ID	(0040,1001)	2	From worklist
>Requested Procedure Description	(0032,1060)	2	From worklist
>Requested Procedure Code Sequence	(0032,1064)	2	From worklist
>Code Value	(0008,0100)	1	Required if a sequence item is present
>Code scheme designator	(0008,0102)	1	Required if a sequence item is present
>Code meaning	(0008,0104)	1	Required if a sequence item is present
Performed Procedure Code Sequence	(0040,A372)	2	A sequence that conveys the type of procedure per formed.
>Code Value	(0008,0100)	1	Required if a sequence item is present
>Code scheme designator	(0008,0102)	1	Required if a sequence item is present
>Code meaning	(0008,0104)	1	Required if a sequence item is present
Current Requested Proce dure Evidence Sequence	(0040,A375)	1C	A sequence that provides references to the list of all the acquired and stored x-ray images and DoseMap photos of the study.
>Study Instance UID	(0020,000D)	1	Required if a sequence item is present
>Referenced Series Sequence	(0008,1115)	1	Required if a sequence item is present
>>Series Instance UID	(0020,000E)	1	Required if a sequence item is present
>>Referenced SOP Sequence	(0008,1199)	1	Required if a sequence item is present

Attribute name	Tag	Type	Attribute description
>>>Referenced SOP Class UID	(0008,1150)	1	Required if a sequence item is present
>>>Referenced SOP Instance UID	(0008,1155)	1	Required if a sequence item is present

11.5.6.2 SR Document Content module

This section specifies the Attributes contained in the SR Document Content Module. The Attributes in this Module convey the content of an SR Document.

Table 11-10 SR Document Content Module Attributes

Attribute name	Tag	Type	Attribute description
Observation DateTime	(0040,A032)	1C	The date and time on which this Content Item was completed.
Content Template Sequence	(0040,A504)	1C	Template that describes the content of this Content Item and its subsidiary Content Items. Only a single Item shall be permitted in this sequence.
>Mapping Resource	(0008,0105)	1	DCMR
>Template Identifier	(0040,DB00)	1	10001
Value Type	(0040,A040)	1	CONTAINER
Continuity of Content	(0040,A050)	1C	"SEPARATE"
Concept Name Code Sequence	(0040,A043)	1C	
>Code Value	(0008,0100)	1	113701
>code scheme designator	(0008,0102)	1	DCM
>Code meaning	(0008,0104)	1	“X-Ray Radiation Dose Report”
Content Sequence	(0040,A730)	1C	Sequence of Content Items, with possible recursive subsidiary Content Items, encoding the hierarchical tree of SR content.
> Relationship Type	(0040,A010)	1	
> Insert SR DocumentContent Module			Recursive inclusion to create document content tree. See 11.6 Standard, Standard Extended Templates for the list of supported templates.

The product supports the following root Templates for SR SOP Instances created by the product.

Table 11-11 SR Root Templates

SOP Class	Template ID	Template Name	Use
X-Ray Radiation Dose SR	10001	X-Ray Radiation Dose	Create

11.5.6.3 SOP Common module

Table 11-12 SOP Common Module attributes

Attribute name	Tag	Type	Attribute description
SOP Class UID	(0008,0016)	1	1.2.840.10008.5.1.4.1.1.88.67
SOP Instance UID	(0008,0018)	1	Restricted to 64 characters, internally generated.
Specific Character Set	(0008,0005)	1C	One of the characters sets listed in section 4.1
Instance number	(0020,0013)	3	Instance number.

11.6 Standard, Standard Extended Templates

The Product supports the Standard Extended Templates defined in the following sections.

11.6.1 Standard Templates

The Product supports the following standard templates for SOP Instances created by this product.

For the implementation of Coding Scheme Designator in Stractured Report:

- Software Build 2.x: Always set to SRT.
- Software Build 3.x and above: Set to SRT or SCT based on the configuration.

11.6.1.1 TID 10001 X-Ray Radiation Dose

Table 11-13 Template ID 10001 X-Ray Radiation Dose

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (113701, DCM, "X-Ray Radiation Dose Report")	1	M		Root node
1b	>	HAS CONCEPT MOD	INCLUDE	DTID 1204 “Language of Content Item and Descendants”	1	U		
2	>	HAS CONCEPT MOD	CODE	EV (121058, DCM, "Procedure reported")	1	M		DT (113704, DCM, "Projection X-Ray")
3	>>	HAS CONCEPT MOD	CODE	EV (363703001, SCT, "Has Intent")	1	M		DCID 3629 “Procedure Intent”
4	>	CONTAINS	CODE	EV (122142, DCM, "Acquisition Device Type")	1	U		DCID 10032 “Projection X-Ray Acquisition Device Type”
5	>		INCLUDE	DTID 1002 “Observer Context”	1-n	M		
6	>	HAS OBS CONTEXT	CODE	EV (113705, DCM, "Scope of Accumulation")	1	M		DCID 10000 “Scope of Accumulation”

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
7	>>	HAS PROPERTIES	UIDREF	DCID 10001 “UID Type”	1	M		
8	>	CONTAINS	CODE	EV (113945, DCM, "X-Ray Detector Data Available")	1	U		DCID 230 “Yes-No”
9	>	CONTAINS	CODE	EV (113943, DCM, "X-Ray Source Data Available")	1	U		DCID 230 “Yes-No”
10	>	CONTAINS	CODE	EV (113944, DCM, "X-Ray Mechanical Data Available")	1	U		DCID 230 “Yes-No”
11	>	CONTAINS	INCLUDE	DTID 10002 “Accumulated X-Ray Dose”	1	MC	IFF Single Plane system	$Plane = EV (113622, DCM, "Single Plane")
12	>	CONTAINS	INCLUDE	DTID 10002 “Accumulated X-Ray Dose”	1	MC	IFF Biplane system	$Plane = EV (113620, DCM, "Plane A") Not Applicable.
13	>	CONTAINS	INCLUDE	DTID 10002 “Accumulated X-Ray Dose”	1	MC	IFF Biplane system	$Plane = EV (113621, DCM, "Plane B") Not Applicable.
14	>	CONTAINS	INCLUDE	DTID 10003 “Irradiation Event X-Ray Data”	1-n	MC	IF any of the values of TID (10001) Row 18 are not (113858, DCM, "MPPS Content"), (113866, DCM, "Copied From Image Attributes") or (113867, DCM, "Computed From Image Attributes")	
15	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	U		Set to “X-Ray Radiation Dose Structure Report”
16	>	CONTAINS	IMAGE	EV (121342, DCM, "Dose Image")	1-n	U		Not Available
17	>	CONTAINS	INCLUDE	DTID 1020 “Person Participant”	1	U		$PersonProcedureRole = EV (113850, DCM, "Irradiation Authorizing")
18	>	CONTAINS	CODE	EV (113854, DCM, "Source of Dose Information")	1-n	M		DCID 10020 “Source of Projection X-Ray Dose Information”

11.6.1.2 TID 10002 Accumulated X-Ray Dose

Table 11-14 Template ID 10002 Accumulated X-Ray Dose

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (113702, DCM, "Accumulated X-Ray Dose Data")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (113764, DCM, "Acquisition Plane")	1	M		Set to (113622, DCM, Single Plane)
3	>	CONTAINS	CONTAINER	EV (122505, DCM, "Calibration")	1-n	MC	IFF Calibration Data is available	Not Available.
4	>>	HAS CONCEPT MOD	CODE	EV (113794, DCM, "Dose Measurement Device")	1	M		DCID 10010 “Dose Measurement Device” Not Available.
5	>>	CONTAINS	DATETIME	EV (113723, DCM, "Calibration DateTime")	1	M		Not Available.
6	>>	CONTAINS	NUM	EV (122322, DCM, "Calibration Factor")	1	M		UNITS = EV (1, UCUM, "no units") Not Available.
7	>>	CONTAINS	NUM	EV (113763, DCM, "Calibration Uncertainty")	1	M		UNITS = EV (%, UCUM, "Percent") Not Available.
8	>>	CONTAINS	TEXT	EV (113724, DCM, "Calibration Responsible Party")	1	M		Not Available
9	>>	CONTAINS	TEXT	EV (113720, DCM, "Calibration Protocol")	1	U		Not Available
10	>	CONTAINS	INCLUDE	DTID 10004 “Accumulated Fluoroscopy and Acquisition Projection X-Ray Dose”	1	MC	IFF TID 10001 Row 4 = (113957, DCM, "Fluoroscopy-Guided Projection Radiography System") or TID 10001 Row 2 = (113704, DCM, "Projection X-Ray") and TID 10001 Row 4 is absent)	Not Available

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
11	>	CONTAINS	INCLUDE	DTID 10005 “Accumulated Mammography X-Ray Dose”	1	MC	IFF TID 10001 Row 2 = (71651007, SCT, "Mammography")	Not Available
12	>	CONTAINS	INCLUDE	DTID 10007 “Accumulated Total Projection Radiography Dose”	1	MC	IFF TID 10001 Row 4 = (113958, DCM, "Integrated Projection Radiography System") or TID (10001) Row 4 = (113957, DCM, "Fluoroscopy-Guided Projection Radiography System") or TID (10001) Row 2 = (113704, DCM, "Projection X-Ray") and TID (10001) Row 4 is absent)	Available for Wallstand, Table, Housing (Wallstand & Table) and Digital Cassette
13	>	CONTAINS	INCLUDE	DTID 10006 “Accumulated Cassette-based Projection Radiography Dose”	1	MC	IFF TID 10001 Row 4 = (113959, DCM, "Cassette-based Projection Radiography System")	Available for Analog Cassette, Mixed (WallStand/Table/Digital Cassette + Analog Cassette), Digital Cassette, and Mixed Cassette (Analog Cassette + Digital Cassette) Exams
14	>	CONTAINS	INCLUDE	DTID 1021 “Device Participant”	1	MC	Required if the irradiating device is not the recording device and the dose was accumulated on a single device.	$DeviceProcedureRole = EV (113859, DCM, "Irradiating Device") Not Available
15	>	CONTAINS	CODE	EV (128750, DCM, "Equipment Landmark")	1	U		EV (128751, DCM, "Center of Table Head") Not Available
16	>>	HAS PROPERTIES	NUM	EV (128752, DCM, "Equipment Landmark X Position")	1	M		UNITS = EV (mm, UCUM, "mm") Not Available

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
17	>>	HAS PROPERTIES	NUM	EV (128753, DCM, "Equipment Landmark Z Position")	1	M		UNITS = EV (mm, UCUM, "mm") Not Available
18	>	CONTAINS	CONTAINER	EV (128754, DCM, "Patient Location Fiducial")	1-n	U		Not Available
19	>>	CONTAINS	INCLUDE	DTID 400 “Reference Location”	1	M		Not Available
20	>>	HAS PROPERTIES	NUM	EV (128756, DCM, "Equipment Landmark to Patient Fiducial Z Distance")	1	M		UNITS = EV (mm, UCUM, "mm") Not Available

11.6.1.3 TID 10003 Irradiation Event X-Ray Data

Table 11-15 TID 10003 Irradiation Event X-Ray Data

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (113706, DCM, "Irradiation Event X-Ray Data")	1	M		
2	>	HAS CONCEPT MOD	CODE	EV (113764, DCM, "Acquisition Plane")	1	M		DCID 10003 “Equipment Plane Identification”
3	>	CONTAINS	UIDREF	EV (113769, DCM, "Irradiation Event UID")	1	M		
4	>	CONTAINS	TEXT	EV (113605, DCM, "Irradiation Event Label")	1	U		Not Available
5	>>	HAS CONCEPT MOD	CODE	EV (113606, DCM, "Label Type")	1	MC	IF the value of Row 4 is the value of an Attribute in the images.	DCID 10022 “Label Type” Not Available
5a	>	CONTAINS	CODE	EV (128551, DCM, "Is Repeated Acquisition")	1	U		DCID 231 “Yes-No Only” Not Available
5b	>>	HAS CONCEPT MOD	CODE	EV (128552, DCM, "Reason for Repeating Acquisition")	1	MC	IFF value of Row 5a = (373066001, SCT, "Yes")	DCID 10034 “Reason for Repeating Acquisition” DCID 7011 “Rejected for Quality Reason” Not Available

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
5c	>>	HAS PROPERTIES	UIDREF	EV (113769, DCM, "Irradiation Event UID")	1	UC	IFF value of Row 5a = (373066001, SCT, "Yes")	Not Available
6	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
7	>	CONTAINS	CODE	EV (113721, DCM, "Irradiation Event Type")	1	M		DCID 10002 “Irradiation Event Type” Set to (113611, DCM, Stationary Acquisition)
8	>	CONTAINS	TEXT	EV (125203, DCM, "Acquisition Protocol")	1	U		Set to “Receptor, Exam name, View name, Patient Size” Example: “Receptor: WALLSTAND, Exam name: CHEST, View name: PA, Patient Size: MEDIUM_ADULT ”
11	>	CONTAINS	CODE	EV (111031, DCM, "Image View")	1	U		DCID 4010 “DX View”
12	>>	HAS CONCEPT MOD	CODE	EV (111032, DCM, "Image View Modifier")	1-n	U		DCID 4011 “DX View Modifier” Not Available
13	>>	CONTAINS	CODE	EV (113946, DCM, "Projection Eponymous Name")	1	U		DCID 4012 “Projection Eponymous Name” Not Available
14	>	CONTAINS	CODE	EV (113745, DCM, "Patient Table Relationship")	1	U		DCID 21 “Patient Equipment Relationship”
15	>	CONTAINS	CODE	EV (113743, DCM, "Patient Orientation")	1	U		DCID 19 “Patient Orientation”
16	>>	HAS CONCEPT MOD	CODE	EV (113744, DCM, "Patient Orientation Modifier")	1	M		DCID 20 “Patient Orientation Modifier”
17	>	CONTAINS	CODE	EV (123014, DCM, "Target Region")	1	M		DCID 4031 “Common Anatomic Region”

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
17b	>>	HAS CONCEPT MOD	CODE	EV (272741003, SCT, "Laterality")	1	UC	If anatomy is bi-lateral	DCID 244 “Laterality”
18	>	CONTAINS	NUM	EV (122130, DCM, "Dose Area Product")	1	MC	IFF TID 10001 Row 2 = (113704, DCM, "Projection X-Ray")	UNITS = EV (Gy.m2, UCUM, "Gy.m2")
19	>	CONTAINS	NUM	EV (111634, DCM, "Half Value Layer")	1	U		UNITS = EV (mm, UCUM, "mm") Not Available
20	>	CONTAINS	NUM	EV (111638, DCM, "Patient Equivalent Thickness")	1	U		UNITS = EV (mm, UCUM, "mm") Not Available
21	>	CONTAINS	NUM	EV (111636, DCM, "Entrance Exposure at RP")	1	MC	IF TID 10001 Row 2 = (71651007, SCT, "Mammography") and (TID (10001) Row 9 is absent or value is (373066001, SCT, "Yes")) and (TID (10001) Row 10 is absent or value is (373066001, SCT, "Yes"))	UNITS = EV (mGy, UCUM, "mGy") Not Available
22	>	CONTAINS	TEXT	EV (113780, DCM, "Reference Point Definition")	1	MC	IF Row 21 is present and Row 23 is not present	Not Available
23	>	CONTAINS	CODE	EV (113780, DCM, "Reference Point Definition")	1	MC	IF Row 21 is present and Row 22 is not present	DCID 10025 “Radiation Dose Reference Point”
24	>	CONTAINS	INCLUDE	DTID 4007 “Mammography CAD Breast Composition”	1	U		Not Available
25	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	U		Not Available
26	>	CONTAINS	INCLUDE	DTID 1020 “Person Participant”	1-n	U		$PersonProcedureRole = EV (113851, DCM, "Irradiation Administering")
27	>	CONTAINS	INCLUDE	DTID 10003A “Irradiation Event X-Ray Detector Data”	1	MC	IFF TID 10001 Row 8 is absent or has a value of (373066001, SCT, "Yes")	Available for Digital cassete, Table and Wallstand only.

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
28	>	CONTAINS	INCLUDE	DTID 10003B “Irradiation Event X-Ray Source Data”	1	MC	IFF TID 10001 Row 9 is absent or has a value of (373066001, SCT, "Yes")	Available for Digital cassete, Table and Wallstand only.
29	>	CONTAINS	INCLUDE	DTID 10003C “Irradiation Event X-Ray Mechanical Data”	1	MC	IFF TID 10001 Row 10 is absent or has a value of (373066001, SCT, "Yes")	

11.6.1.4 TID 10003A Irradiation Event X-Ray Detector Data

Table 11-16 TID 10003A Irradiation Event X-Ray Detector Data

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			NUM	EV (113845, DCM, "Exposure Index")	1	MC	IF the value is displayable to the X-Ray system operator.	UNITS = EV (1, UCUM, "no units")
2			NUM	EV (113846, DCM, "Target Exposure Index")	1	MC	IF the value is displayable to the X-Ray system operator.	UNITS = EV (1, UCUM, "no units")
3			NUM	EV (113847, DCM, "Deviation Index")	1	MC	IF the value is displayable to the X-Ray system operator.	UNITS = EV (1, UCUM, "no units")
4			INCLUDE	DTID 1021 “Device Participant”	1	U		$DeviceProcedureRole = EV (113942, DCM, "X-Ray Reading Device") Not Available.
5			IMAGE	EV (113795, DCM, "Acquired Image")	1-n	MC	IFF Image Object is created for this irradiation event	Available for Digital cassete, Table and Wallstand only.

11.6.1.5 TID 10003B Irradiation Event X-Ray Source Data

This Template contains data that is expected to be available to the X-Ray source component of the equipment.

Table 11-17 TID 10003B Irradiation Event X-Ray Source Data

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			NUM	EV (113738, DCM, "Dose (RP)")	1	MC	IF TID 10001 Row 2 = (113704, DCM, "Projection X-Ray") AND any of the values of TID (10001) Row 18 are not (113858, DCM, "MPPS Content")	UNITS = EV (Gy, UCUM, "Gy")
2			TEXT	EV (113780, DCM, "Reference Point Definition")	1	MC	IF Row 1 is present and Row 3 is not present	Not Available
3			CODE	EV (113780, DCM, "Reference Point Definition")	1	MC	IF Row 1 is present and Row 2 is not present	DCID 10025 “Radiation Dose Reference Point” Set to (113964, DCM, At Surface of Patient)
4			NUM	EV (111631, DCM, "Average Glandular Dose")	1	MC	IFF TID 10001 Row 2 = (71651007, SCT, "Mammography")	UNITS = EV (mGy, UCUM, "mGy") Not Available
5			CODE	EV (113732, DCM, "Fluoro Mode")	1	UC	IFF TID 10003 Row 7 value = (44491008, SCT, "Fluoroscopy")	DCID 10004 “Fluoro Mode” Not Available
6			NUM	EV (113791, DCM, "Pulse Rate")	1	MC	IFF Row 5 value = (113631, DCM, "Pulsed")	UNITS = EV ({pulse}/s, UCUM, "pulse/s") Not Available
7			NUM	EV (113768, DCM, "Number of Pulses")	1	MC	IFF Row 5 is not present or Row 5 is present and equals (113631, DCM, "Pulsed")	UNITS = EV (1, UCUM, "no units") Available for Digital cassete, Table and Wallstand only.
8	>	HAS CONCEPT MOD	CODE	EV (121401, DCM, "Derivation")	1	MC	IFF count of pulses in Row 7 is estimated	EV (414135002, SCT, "Estimated") Available for Digital cassete, Table and Wallstand only.
9			NUM	EV (113793, DCM, "Pulse Width")	1-n	U		UNITS = EV (ms, UCUM, "ms")
10			NUM	EV (113742, DCM, "Irradiation Duration")	1	U		UNITS = EV (s, UCUM, "s") Not Available

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
11			NUM	EV (113733, DCM, "KVP")	1-n	M		UNITS = EV (kV, UCUM, "kV") Available for Digital cassete, Table and Wallstand only.
12			NUM	EV (113734, DCM, "X-Ray Tube Current")	1-n	MC	IF Row 15 is not present	UNITS = EV (mA, UCUM, "mA") Available for Digital cassete, Table and Wallstand only.
13			NUM	EV (113767, DCM, "Average X-Ray Tube Current")	1	U		UNITS = EV (mA, UCUM, "mA") Not Available
14			NUM	EV (113824, DCM, "Exposure Time")	1	MC	IF Row 15 is not present	UNITS = EV (ms, UCUM, "ms") Available for Digital cassete, Table and Wallstand only.
15			NUM	EV (113736, DCM, "Exposure")	1-n	MC	IF Row 12 or 14 is not present	UNITS = EV (uA.s, UCUM, "uA.s") Available for Digital cassete, Table and Wallstand only.
16			NUM	EV (113766, DCM, "Focal Spot Size")	1	U		UNITS = EV (mm, UCUM, "mm") Available for Digital cassete, Table and Wallstand only.
17			CODE	EV (111632, DCM, "Anode Target Material")	1	U		DCID 10016 “Anode Target Material”
18			CONTAINER	EV (113771, DCM, "X-Ray Filters")	1-n	U		
19	>	CONTAINS	CODE	EV (113772, DCM, "X-Ray Filter Type")	1	U		DCID 10007 “X-Ray Filter Type” Available for Digital cassete, Table and Wallstand only.
20	>	CONTAINS	CODE	EV (113757, DCM, "X-Ray Filter Material")	1	U		DCID 10006 “X-Ray Filter Material”
21	>	CONTAINS	NUM	EV (113758, DCM, "X-Ray Filter Thickness Minimum")	1	U		UNITS = EV (mm, UCUM, "mm")

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
22	>	CONTAINS	NUM	EV (113773, DCM, "X-Ray Filter Thickness Maximum")	1	U		UNITS = EV (mm, UCUM, "mm")
23			NUM	EV (113790, DCM, "Collimated Field Area")	1	U		UNITS = EV (m2, UCUM, "m2") Not Available
24			NUM	EV (113788, DCM, "Collimated Field Height")	1	U		UNITS = EV (mm, UCUM, "mm")
25			NUM	EV (113789, DCM, "Collimated Field Width")	1	U		UNITS = EV (mm, UCUM, "mm")
26			CODE	EV (111635, DCM, "X-Ray Grid")	1-n	U		DCID 10017 “X-Ray Grid”
27			INCLUDE	DTID 1021 “Device Participant”	1	MC	Required if the irradiating device is not the recording device.	$DeviceProcedure Role = EV (113859, DCM, "Irradiating Device") Not Available

Table 11-18 Content Item Descriptions

Row 1	Dose applied by this irradiation event, relative to defined reference point.
Row 7	If a precise count of pulses is not available, an estimated number shall be provided, and the Row 8 Concept Modifier shall indicate "Estimated"
Row 9	Pulse width as measured/recorded by the system, either as a single total value, or as multiple values. If multiple values are provided, their number shall match the value in Row 7 "Number of Pulses".
Row 11	KVP value as measured/recorded by system, either as a single mean value, or as multiple values. If multiple values are provided, their number shall match the value in Row 7 "Number of Pulses".
Row 12	Tube current as measured/recorded by system, either as a single mean value, or as multiple values. If multiple values are provided, their number shall match the value in Row 7 "Number of Pulses".
Row 14	Exposure time as measured/recorded by the system.
Row 15	Exposure as measured/recorded by system, either as a single total value, or as multiple values. If multiple values are provided, their number shall match the value in Row 7 "Number of Pulses". The Exposure will be affected by the shape of the pulse and other factors and may not be a simple multiplication of tube current and exposure time.
Row 18	If one or more Filter(s) were applied during this irradiation event
Row 23	Collimated area at the receptor plane.
Row 27	The device that produced the irradiation in this Irradiation Event. I.e., the X-Ray source This is not required to be present if the information is the same as that already recorded in TID 1004 “Device Observer Identifying Attributes” encoded via the inclusion of TID 1002 “Observer Context” in TID 10001 “Projection X-Ray Radiation Dose” Row 5, which in turn may be absent if identical to the content in the Enhanced General Equipment Module.

11.6.1.6 TID 10003C Irradiation Event X-Ray Mechanical Data

This template contains data that is expected to be available to the gantry or mechanical component of the equipment.

Table 11-19 TID 10003C Irradiation Event X-Ray Mechanical Data

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CODE	EV (113956, DCM, "CR/DR Mechanical Configuration")	1	U		DCID 10031 “CR/DR Mechanical Configuration” Set to values below: "DCM","113952","Table Mount" for Table, Or "DCM","113954","Upright Stand Mount" – for WallStand, Or "DCM","113953","Unmounted Detector" – for Digital Cassette and Analog Cassette
2			NUM	EV (112011, DCM, "Positioner Primary Angle")	1	UC	XOR Row 6	Not Available
3			NUM	EV (112012, DCM, "Positioner Secondary Angle")	1	UC	XOR Row 6	Not Available
4			NUM	EV (113739, DCM, "Positioner Primary End Angle")	1	UC	IFF TID 10003 Row 7 value = (113613, DCM, "Rotational Acquisition")	Not Available
5			NUM	EV (113740, DCM, "Positioner Secondary End Angle")	1	UC	IFF TID 10003 Row 7 value = (113613, DCM, "Rotational Acquisition")	Not Available
6			NUM	EV (113770, DCM, "Column Angulation")	1	UC	XOR Rows 2, 3	Not Available
7			NUM	EV (113754, DCM, "Table Head Tilt Angle")	1	U		Not Available
8			NUM	EV (113755, DCM, "Table Horizontal Rotation Angle")	1	U		Not Available
9			NUM	EV (113756, DCM, "Table Cradle Tilt Angle")	1	U		Not Available
10			NUM	EV (111633, DCM, "Compression Thickness")	1	U		Not Available
10a			NUM	EV (111647, DCM, "Compression Force")	1	U		Not Available

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
10b			NUM	EV (111648, DCM, "Compression Pressure")	1	U		Not Available
10c			NUM	EV (111649, DCM, "Compression Contact Area")	1	U		Not Available
11			NUM	DCID 10008 “Dose Related Distance Measurement”	1-n	U		UNITS = EV (mm, UCUM, "mm") Set to values below: (113748, DCM, Distance Source to Isocenter), Or (113750, DCM, Distance Source to Detector)
12			NUM	EV (128757, DCM, "Positioner Isocenter Primary Angle")	1	U		Not Available
13			NUM	EV (128758, DCM, "Positioner Isocenter Secondary Angle")	1	U		Not Available
14			NUM	EV (128759, DCM, "Positioner Isocenter Detector Rotation Angle")	1	U		Not Available
15			NUM	EV (128760, DCM, "Positioner Isocenter Primary End Angle")	1	U		Not Available
16			NUM	EV (128761, DCM, "Positioner Isocenter Secondary End Angle")	1	U		Not Available
17			NUM	EV (128762, DCM, "Positioner Isocenter Detector Rotation End Angle")	1	U		Not Available
18			NUM	EV (128763, DCM, "Table Head Tilt End Angle")	1	U		Not Available
19			NUM	EV (128764, DCM, "Table Horizontal Rotation End Angle")	1	U		Not Available
20			NUM	EV (128765, DCM, "Table Cradle Tilt End Angle")	1	U		Not Available

11.6.1.7 TID 10006 Accumulated Cassette-based Projection Radiography Dose

Table 11-20 Accumulated Cassette-based Projection Radiography Dose

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CODE	EV (113947, DCM, "Detector Type")	1	MC	IF TID 10001 Row 8 is absent or value is (373066001, SCT, "Yes")	DCID 10030 “Detector Type”
2			NUM	EV (113731, DCM, "Total Number of Radiographic Frames")	1	MC	IF TID 10001 Row 8 is absent or value is (373066001, SCT, "Yes")	UNITS = EV (1, UCUM, "no units")

11.6.1.8 TID 10007 Accumulated Total Projection Radiography Dose

Table 11-21 TID 10007 Accumulated Total Projection Radiography Dose

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			NUM	EV (113722, DCM, "Dose Area Product Total")	1	M		UNITS = EV (Gy.m2, UCUM, "Gy.m2")
2			NUM	EV (113725, DCM, "Dose (RP) Total")	1	MC	IF TID 10001 Row 4 = (113958, DCM, "Integrated Projection Radiography System") or any of the values of TID (10001) Row 18 are not (113858, DCM, "MPPS Content").	UNITS = EV (Gy, UCUM, "Gy")
3			NUM	EV (113737, DCM, "Distance Source to Reference Point")	1	U		UNITS = EV (mm, UCUM, "mm")
4			NUM	EV (113731, DCM, "Total Number of Radiographic Frames")	1	U		UNITS = EV (1, UCUM, "no units")
5			CODE	EV (113780, DCM, "Reference Point Definition")	1	MC	IF any of (113725, DCM, "Dose (RP) Total"), (113728, DCM, "Fluoro Dose (RP) Total") or (113729, DCM, "Acquisition Dose (RP) Total") are present, and Row 6 is not present.	DCID 10025 “Radiation Dose Reference Point”
6			TEXT	EV (113780, DCM, "Reference Point Definition")	1	MC	IF any of (113725, DCM, "Dose (RP) Total"), (113728, DCM, "Fluoro Dose (RP) Total") or (113729, DCM, "Acquisition Dose (RP) Total") are present, and Row 5 is not present.	

11.6.1.9 TID 1002 Observer Context

Table 11-22 TID 1002 Observer Context

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		HAS OBS CONTEXT	CODE	EV (121005, DCM, "Observer Type")	1	MC	IF Observer type is device	DCID 270 “Observer Type” Defaults to (121006, DCM, "Person")
2		HAS OBS CONTEXT	INCLUDE	DTID 1003 “Person Observer Identifying Attributes”	1	MC	IFF Row 1 value = (121006, DCM, "Person") or Row 1 is absent	Not Available. Observer is device, not person.
3		HAS OBS CONTEXT	INCLUDE	DTID 1004 “Device Observer Identifying Attributes”	1	MC	IFF Row 1 value = (121007, DCM, "Device")	Refer to TID 1004
4		HAS OBS CONTEXT	INCLUDE	DTID 1015 “Person Observer Description”	1	U		Not Available

11.6.1.10 TID 1003 Person Observer Identifying Attributes

Table 11-23 TID 1003 Person Observer Identifying Attributes

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			PNAME	EV (121008, DCM, "Person Observer Name")	1	M		Not Available. Observer is device, not person.
1a			TEXT	EV (128774, DCM, "Person Observer's Login Name")	1	U		Not Available.
2			TEXT	EV (121009, DCM, "Person Observer's Organization Name")	1	U		Defaults to Value of Institution Name (0008,0080) of the General Equipment Module Not Available.
3			CODE	EV (121010, DCM, "Person Observer's Role in the Organization")	1	U		BCID 7452 “Organizational Role” Not Available.
4			CODE	EV (121011, DCM, "Person Observer's Role in this Procedure")	1	U		BCID 7453 “Performing Role” Not Available.
5	>	HAS CONCEPT MOD	TEXT	EV (128775, DCM, "Identifier within Person Observer's Role")	1	U		Not Available.

11.6.1.11 TID 1004 Device Observer Identifying Attributes

Table 11-24 TID 1004 Device Observer Identifying Attributes

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			UIDREF	EV (121012, DCM, "Device Observer UID")	1	M		Defaults to Value of Device UID (0018,1002) of the General Equipment Module
2			TEXT	EV (121013, DCM, "Device Observer Name")	1	U		Defaults to Value of Station Name (0008,1010) of the General Equipment Module Not Available.
3			TEXT	EV (121014, DCM, "Device Observer Manufacturer")	1	U		Defaults to Value of Manufacturer (0008,0070) of the General Equipment Module Set to “GE Healthcare”
4			TEXT	EV (121015, DCM, "Device Observer Model Name")	1	U		Defaults to Value of Manufacturer's Model Name (0008,1090) of the General Equipment Module Set to product name.
5			TEXT	EV (121016, DCM, "Device Observer Serial Number")	1	U		Defaults to Value of Device Serial Number (0018,1000) of the General Equipment Module Not Available.
6			TEXT	EV (121017, DCM, "Device Observer Physical Location During Observation")	1	U		Set to location of the system, value is from the configuration.
7			CODE	EV (113876, DCM, "Device Role in Procedure")	1-n	U		BCID 7445 “Device Participating Role” Set to (113859, DCM, Irradiating Device)
8			TEXT	EV (110119, DCM, "Station AE Title")	1	U		Not Available.

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
9			UIDREF	EV (121061, DCM, "Device Observer Manufacturer Class UID")	1-n	U		Defaults to Value of Manufacturer's Device Class UID (0018,100B) of the General Equipment Module. Not Available.
10			CONTAINER	EV (121000, DCM, "Unique Device Identifiers")	1-n	U		Defaults to Value of UDI Sequence (0018,100A) of the General Equipment Module Not Available.
11	>	CONTAINS	TEXT	EV (74711-3, LN, "Unique Device Identifier")	1	M		Not Available.
12	>	CONTAINS	TEXT	EV (120999, DCM, "Device Description")	1	U		Not Available.

11.6.1.12 Table CID 10008. Dose Related Distance Measurements

Table 11-25 CID 10008. Dose Related Distance Measurements

Coding Scheme Designator	Code Value	Code Meaning	Included - Single Type Exposure
DCM	113748	Distance Source to Isocenter	Available for Wallstand and Table Mode
DCM	113737	Distance Source to Reference Point	Available for Wallstand and Table Mode
DCM	113750	Distance Source to Detector	Available for Wallstand and Table Mode

Chapter 12 Audit Trail Messages

12.1 Audit Trail Messages

This section specifies the DICOM Specific Audit Message that the system can detect and report.

Table 12-1 Supported Audit Message Table

Audit Message	Usage	Reference
Application Activity	Used	Application Activity
Audit Log Used	Not Used	N/A
Begin Transferring DICOM	Used	
Data Export	Not used	N/A
Data Import	Not used	N/A
DICOM Instance Transferred	Used	DICOM Instance Transferred
DICOM Study Deleted	Used	DICOM Study Deleted
DICOM Instance Accessed	Used	DICOM Instance Accessed
Network Entry	Not used	N/A
User Authentication	Used	User Authentication
Query	Used	Query
Security Alert	Used	Security Alert
Patient Record	Used	Patient Record

12.2 Audit Message Description

The following subsections define message details and specializations used by the Fixed RAD system as part of the DICOM Audit Trail Profile.

12.2.1 Application Activity

This audit message describes the event of an application starting or stopping. The Definium Pace Select system will generate audit messages when the system starts or stops.

Table 12-2 Application Activity Message

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110100, DCM, "Application Activity")
	EventActionCode	M	Enumerated Value E = Execute
	EventDateTime	M	Internally generated in UTC format

Real World Entities	Field Name	Opt.	Value Constraints
	EventOutcomeIndicator	M	If application start or stop successfully, the value will be 0. If the application fails to start, the value will be 4
	EventTypeCode	M	DT (110120, DCM, "Application Start") DT (110121, DCM, "Application Stop")
Active Participant: Application started (1)	UserID	M	ProcessName
	AlternativeUserID	MC	Local AE Title
	UserName	U	NA
	UserIsRequestor	M	Value is “FALSE”
	RoleIDCode	M	EV (110150, DCM, "Application")
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Active Participant: Persons and or processes that started the app (0...N)	UserID	M	User ID of the user who logs into the system
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	Value is “TRUE”
	RoleIDCode	M	EV (110151, DCM, "Application Launcher")
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Audit Source	AuditEnterpriseSiteID	U	Not Used
	AuditSourceID	M	The value configured in the Audit Message Settings page
	AuditSourceTypeCode	U	2

12.2.2 Begin Transferring DICOM Instances

This message describes the event of a system beginning to transfer a set of DICOM instances from one node to another within control of the system's security domain. This message only includes information about a single patient.

The system will generate this audit message when it begins to transfer the DICOM instances (DX Image, X-Ray Radiation Dose SR) to another node.

Table 12-3 Audit Message for Begin Transferring DICOM Instances

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110102, DCM, "Begin Transferring DICOM Instances")
	EventActionCode	M	Enumerated Value E = Execute
	EventDateTime	M	Internally generated in UTC format
	EventOutcomeIndicator	M	If the system begins to transfer the DICOM
			instance successfully, the value will be 0
	EventTypeCode	U	Not Used
Active Participant: Process Sending the Data (1)	UserID	M	Process Name
	AlternativeUserID	U	Not Used
	UserName	U	NA
	UserIsRequestor	M	If the transfer of the DICOM instance is initi ated by the user, the value will be “FALSE”. If the transfer of the DICOM instance is initiat ed by the system, the value will be “TRUE”.
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTy peCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Active Participant: Process receiving the data (1)	UserID	M	Destination host AE Title
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	FALSE
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTy peCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Active Participant: Other Participants (0...N)	UserID	M	Sent with value as the User ID of the user who logs into the system when the transfer of a DICOM instance is initiated manually by the user.
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	If the transfer of the DICOM instance is initiated by the user, the value will be “TRUE”.
	RoleIDCode	U	Not Used
	NetworkAccessPointTy peCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Participating Object: Studies being transferred (1...N)	ParticipantObjectTypeC ode	M	2 = system
	ParticipantObjectTypeC odeRole	M	3 = report
	ParticipantObjectDataLi	U	Not Used

Real World Entities	Field Name	Opt.	Value Constraints
	feCycle		
	ParticipantObjectIDTypeCode	M	EV (110180, DCM, "Study Instance UID")
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Study Instance UID of the study(ies) transferred
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used
	ParticipantObjectDetail	U	Not Used
	ParticipantObjectDescription	U	Not Used
	SOPClass	MC	Not Used
	Accession	U	Not Used
	NumberOfInstances	U	Not Used
	Instances	U	Not Used
	Encrypted	U	Not Used
	Anonymized	U	Not Used
Participating Object:	ParticipantObjectTypeCode	M	1 = person
	ParticipantObjectTypeCodeRole	M	1 = patient
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDTypeCode	M	EV (2, RFC-3881, “Patient Number”)
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Patient ID anonymized
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used
	ParticipantObjectDetail	U	Not Used
	ParticipantObjectDescription	U	Not Used
Audit Source	AuditEnterpriseSiteID	U	Not Used
	AuditSourceID	M	The value configured in the Audit Message Settings page
	AuditSourceTypeCode	M	2

NOTE

The system supports the DICOM instance transfer at patient level, study level and sequence level or photo level. In each level push, only one audit event will be generated with the respective “Participating Object: Studies being transferred” block.

12.2.3 DICOM Instance Transferred

This message describes the event of the completion of transferring DICOM SOP Instances between two Application Entities. This message only includes information about a single patient.

The system will generate this audit event upon the completion of transferring DICOM SOP Instances between two Application Entities.

NOTE

This message may have been preceded by a Begin Transferring Instances message. The Begin Transferring Instances message conveys the intent to store SOP Instances, while the Instances Transferred message records the completion of the transfer.

Table 12-4 Audit Message for DICOM Instance Transferred

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110104, DCM, "DICOM Instances Trans ferred")
	EventActionCode	M	Value is “R”
	EventDateTime	M	Internally generated in UTC format
	EventOutcomeIndicator	M	If the transfer of DICOM instance completed successfully, the value will be 0. If the trans fer of DICOM instance failed, the value will be 4
	EventTypeCode	U	Not Used
Active Participant: Process that sent the data (1)	UserID	M	Local AE Title
	AlternativeUserID	U	Not Used
	UserName	U	Local Username
	UserIsRequestor	M	If the transfer of the DICOM instance is initi ated by the user, the value will be “FALSE”. If the transfer of the DICOM instance is initiat ed by the system, the value will be “TRUE”.
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Active Participant: The process that received the data (1)	UserID	M	Destination host AE Title
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	FALSE
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Active Participant: Other participants that are known, especially third par- ties that are the requestor (0...N)	UserID	M	Send with value as User ID of the user who logs into the system when the transfer of DICOM instance is initiated manually by the User
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	If the transfer of the DICOM instance is initiated by the user, the value will be “TRUE”.
	RoleIDCode	U	Not Used
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used

Real World Entities	Field Name	Opt.	Value Constraints
Participating Object: Studies being transferred (1...N)	ParticipantObjectTypeCode	M	2 = system
	ParticipantObjectTypeCodeRole	M	3 = report
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDTypeCode	M	EV (110180, DCM, "Study Instance UID")
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Study Instance UID of the study [ies] transferred
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used
	ParticipantObjectDetail	U	Not Used
	ParticipantObjectDescription	U	Not Used
	SOPClass	MC	Not Used
	Accession	U	Not Used
	NumberOfInstances	U	Not Used
	Instances	U	Not Used
	Encrypted	U	Not Used
	Anonymized	U	Not Used
Participating Object: Patient (1)	ParticipantObjectTypeCode	M	1 = person
	ParticipantObjectTypeCodeRole	M	1 = patient
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDTypeCode	M	EV (2, RFC-3881, “Patient Number”)
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Patient ID anonymized
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used
	ParticipantObjectDetail	U	Not Used
	ParticipantObjectDescription	U	Not Used
Audit Source	AuditEnterpriseSiteID	U	Not Used
	AuditSourceID	M	The value configured in the Audit Message Settings page
	AuditSourceTypeCode	M	2

NOTE

The system supports the DICOM instance transfer at patient level, study level and sequence level or photo level. In each level push, only one audit event will be generated with the respective “Participating Object: Studies being transferred” block.

12.2.4 DICOM Study Deleted

This message describes the event of deletion of one or more studies and all associated SOP Instances in a single action. This message only includes information about a single patient.

The system generates this audit event when deleting one or more studies from the Image Management Viewer.

Table 12-5 Audit Message for DICOM Study Deleted

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110105, DCM, "DICOM Study Deleted")
	EventActionCode	M	Value is “D”
	EventDateTime	M	Internally generated in UTC format
	EventOutcomeIndicator	M	If a study is deleted successfully, the value will be 0. If the study deletion fails, the value will be 4
	EventTypeCode	U	Not Used
Active Participant: The person or process deleting the study (1…2)	UserID	M	Sent with value as the User ID of the user who logs into the system when the study has been deleted by the user
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	TRUE
	RoleIDCode	U	Not Used
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Participating Object: Studies being transferred (1…N)	ParticipantObjectTypeCode	M	2 = system
	ParticipantObjectTypeCodeRole	M	3 = report
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDTypeCode	M	EV (110180, DCM, "Study Instance UID")
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Study Instance UID of the study [ies] deleted
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used
	ParticipantObjectDetail	U	Not Used
	ParticipantObjectDescription	U	Not Used
	SOPClass	MC	Not Used
	Accession	U	Not Used
	NumberOfInstances	U	Not Used
	Instances	U	Not Used
	Encrypted	U	Not Used
	Anonymized	U	Not Used
Patient (1)	ParticipantObjectTypeCodeRole	M	1 = patient
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDTypeCode	M	EV (2, RFC-3881, “Patient Number”)
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Patient ID anonymized
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used
	ParticipantObjectDetail	U	Not Used
	ParticipantObjectDescription	U	Not Used
Audit Source	AuditEnterpriseSiteID	U	Not Used
	AuditSourceID	M	The value configured in the Audit Message Settings page
	AuditSourceTypeCode	M	2

12.2.5 DICOM Instance Accessed

This message describes the event of DICOM SOP Instances being viewed, utilized, updated, or deleted. This message only includes the information about a single patient. The Fixed RAD system generates this audit event when creating, viewing, updating, deleting a series and/or image.

Table 12-6 Audit Message for DICOM Instance Accessed

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110103, DCM, "DICOM Instances Accessed")
	EventActionCode	M	If a sequence or photo is created, the value will be “C”. If a sequence or photo is reviewed, the value will be “R”. If a sequence or photo is updated, the value will be “U”. If a sequence or photo is deleted, the value will be “D”.
	EventDateTime	M	Internally generated in UTC format
	EventOutcomeIndicator	M	If a sequence or photo is created or updated successfully, the value will be 0. If a sequence or photo is reviewed or deleted successfully, the value will be 0. If the review or deletion of a sequence or photo fails, the value will be 4.
	EventTypeCode	U	Not Used
Active Participant: Person and or Process manipulating the data (1..2)	UserID	M	Process Name
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	FALSE
	RoleIDCode	U	Not Used
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Active Participant: Person and or Process manipulating the data	UserID	M	Sent with value as the User ID of the user who logs into the system
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	TRUE
	RoleIDCode	U	Not Used
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Participating Object: Studies (1..N)	ParticipantObjectTypeCode	M	2 = system
	ParticipantObjectTypeCodeRole	M	3 = report
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDTypeCode	M	EV (110180, DCM, "Study Instance UID")
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Filled with Study Instance UID
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used
	ParticipantObjectDetail	U	Not Used
	ParticipantObjectDescription	U	Not Used
	SOPClass	MC	Not Used
	Accession	U	Not Used
	NumberOfInstances	U	Not Used
	Instances	U	Not Used
	Encrypted	U	Not Used

Real World Entities	Field Name	Opt.	Value Constraints
	Anonymized	U	Not Used
Participating Object: Patient (1)	ParticipantObjectTypeCode	M	1 = person
	ParticipantObjectTypeCodeRole	M	1 = patient
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDTypeCode	M	EV (2, RFC-3881, “Patient Number”)
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Patient ID anonymized
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used
	ParticipantObjectDetail	U	Not Used
	ParticipantObjectDescription	U	Not Used
Audit Source	AuditEnterpriseSiteID	U	Not Used
	AuditSourceID	M	The value configured in the Audit Message Settings page
	AuditSourceTypeCode	M	2

12.2.6 User Authentication

This message describes the event that a user has attempted to log on or log off. This report is made regardless of whether the attempt was successful or not.

The Fixed RAD system generates this audit event when a user logs in (Local user login, Enterprise user login and Emergency user login). It also generates this audit event when a user (Local user) logs out of the system or the admin, service user logs into the authentication settings page.

Table 12-7 Audit Message for User Authentication

Real World Entities	Field Name	Opt.	Value Constraint
Event	EventID	M	EV (110114, DCM, "User Authentication")
	EventActionCode	M	Enumerated Value: E = Execute
	EventDateTime	M	Internally generated in UTC format
	EventOutcomeIndicator	M	If the user logs in or out is successful, the value will be 0. If the use logs in is failed, the value will be 4.
	EventTypeCode	M	Defined Terms: EV (110122, DCM, "Login") EV (110123, DCM, "Logout")
Active Participant: Person Authenticated or claimed (1)	UserID	M	Sent with value as the “User ID@localhost” when a local user logs in or logs out from the system. Sent with value as the “User ID@localhost” when an enterprise user logs into the system. Sent the value as the “User ID” when an enterprise user log in fails. Sent with value as the “EMERGENCY” when emergency user logs out of the system.
	AlternativeUserID	U	Not Used

Real World Entities	Field Name	Opt.	Value Constraint
	UserName	U	Not Used
	UserIsRequestor	M	TRUE
	RoleIDCode	U	EV (110150, DCM, “Application”)
	NetworkAccessPointTypeCode	M	Localhost
	NetworkAccessPointID	M	Localhost
Active Participant: Node or System performing authentication (0...1)	UserID	M	Localhost
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	FALSE
	RoleIDCode	U	Not Used
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	Localhost
Participating Object:	ParticipantObjectTypeCode	U	Not Used
	ParticipantObjectTypeCodeRole	U	Not Used
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDType-Code	M	Value is Empty
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Value is Detail
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used

Real World Entities	Field Name	Opt.	Value Constraint
	ParticipantObjectDetail	U	Type = Detail, Values are as below: When a local user logs in, the values are "Local User Database:Success" or "Local User Database:Logon Failed" or "Local User Database:Insufficient roles" or "Not applicable:Logon Failed" When a local user logs out, the values are “Logout:Success” When an Enterprise user logs in, the values are "LDAP SSL:Success" or "Kerberos SSL:Success" or "LDAP:Success" or "LDAP SSL:Logon Failed" or "LDAP:Logon Failed" or "Kerberos SSL:Logon Failed" or "Kerberos:Logon Failed" or "Not applicable:Logon Failed" or "LDAP SSL:Insufficient roles" or "No User principal found" or "LDAP SSL:Network Problem" or "LDAP:Network Problem" or "Kerberos SSL:Network Problem" or "Kerberos:Network Problem" When an Emergency user logs out, the values are "Logout:Success" **NOTE** The "value" attribute is base-64encoded data.
	SOPClass	MC	Not Used
	Accession	U	Not Used
	MPPS	U	Not Used
	NumberOfInstances	U	Not Used
	Instance	U	Not Used
	Encrypted	U	Not Used
	Anonymized	U	Not Used
	ParticipantObjectContainsStudy	U	Not Used
Audit Source	AuditEnterpriseSiteID	U	Not Used
	AuditSourceID	M	The value configured in the Audit Message Settings page
	AuditSourceTypeCode	M	2

12.2.7 Query

This message describes the event of a Query being issued. The Fixed RAD system generates this audit event when the system performs a modality worklist query to configured worklist host.

Table 12-8 Audit Message for Query

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110112, DCM, "Query")
	EventActionCode	M	Enumerated Value: E = Execute
	EventDateTime	M	Internally generated in UTC format
	EventOutcomeIndicator	M	If the system executed the query successfully, the value will be 0. If the system failed to execute the query, the value will be 4
	EventTypeCode	U	Not Used
Active Participant: Process Issuing the Query (1)	UserID	M	Process Name
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	If the system generates the query automatically, the value will be TRUE. Otherwise the value will be FALSE.
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Active Participant: The process that will respond to the query (1)	UserID	M	Destination host AE Title
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	FALSE
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Active Participant: Other Participants that are known, especially third parties that requested the query (0...N)	UserID	M	If the user who logs in to the system performs the query, the value will be User ID
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	If the user who logs in to the system performs the query, the value will be TRUE
	RoleIDCode	U	Not Used
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Participating Object: SOP Queried and the Query (1)	ParticipantObjectTypeCode	M	2 = system
	ParticipantObjectTypeCodeRole	M	3 = report
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDTypeCode	M	DT (110181, DCM, "SOP Class UID")

Real World Entities	Field Name	Opt.	Value Constraints
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	1.2.840.10008.5.1.4.31
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	M	Dataset of the DICOM query. It is base-64 encoded data
	ParticipantObjectDetail	MC	Type = TransferSyntax, Value = The transfer syntax of the query. It is base-64-encoded data
	ParticipantObjectDescription	U	Not Used
	SOPClass	MC	Not Used
	Accession	U	Not Used
	NumberOfInstances	U	Not Used
	Instances	U	Not Used
	Encrypted	U	Not Used
	Anonymized	U	Not Used
Audit Source	AuditEnterpriseSiteID	U	Not Used
	AuditSourceID	M	The value configured in the Audit Message Settings page
	AuditSourceTypeCode	M	2

12.2.8 Security Alert

This message describes any event for which a node needs to report a security alert. The Fixed RAD system generates this audit event when some security actions (performing different security configurations, DICOM secure communication fails, adding or updating destination hosts, adding or updating usernames or passwords, adding or removing users from groups) occur on the system.

Table 12-9 Audit Message for Security Alert

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110113, DCM, "Security Alert")
	EventActionCode	M	Enumerated Value: E = Execute
	EventDateTime	M	Internally generated in UTC format
	EventOutcomeIndicator	M	Values are 0 or 4
	EventTypeCode	M	Following values are selected from CID 403: ▪ Value will be EV (110129, DCM, "Security Configuration") when performing enterprise authentication enabling or disabling, emergency login enabling or disabling, enterprise server configuration, firewall configuration, System auto lock, NTP Sync lost, NTP synchronization re-establish; ▪ Value will be EV (110126, DCM, "Node Authentication") when performing Service session start or stop, DICOM secure communication fails; ▪ Value will be EV (110128, DCM, "Network Configuration") when performing DICOM

Real World Entities	Field Name	Opt.	Value Constraints
			destination hosts added, connecting system bus devices; ▪ Value will be EV (110135, DCM, "Object Security Attributes Changed") whenperforming DICOM destination hosts update, adding or removing user groups, group roles change, MAC to enable or update mode; ▪ Value will be EV (110137, DCM, "User Security Attributes Changed") when performing update og the username or password, adding or removing users, adding or removing users from groups, enterprise authentication with invalid user, user lock enable or disable, password reset on next logon enable or disable; ▪ Value will be EV (110132, DCM, "Use of Restricted Function") when modifying protected files, unauthorized component execution; ▪ Value will be EV (110131, DCM, "Software Configuration") when performing date, time, time zone change; ▪ Value will be EV (110127, DCM, "Emergency Override Started") when emergency user logs in the system.
Active Participant: Reporting Person and/or Process (1..2)	UserID	M	Value as Local AE Title or EA3 Database or EA3 Configuration Tool or EA3 user.
	AlternativeUserID	U	Not Used
	UserName	U	
	UserIsRequestor	M	TRUE
	RoleIDCode	U	Not Used
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Active Participant: Performing Persons or Processes (0..N)	UserID	M	Values are User ID
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	FALSE
	RoleIDCode	U	Not Used
	NetworkAccessPointType-	U	Not Used
	Code		
	NetworkAccessPointID	U	Not Used
Participating Object: Alert Subject (0..N)	ParticipantObjectTypeCode	M	2 = system
	ParticipantObjectTypeCodeRole	U	13 = security resource
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDTypeCode	M	EV (12, RFC-3881," ") or EV (110182, DCM,"Node ID")

Real World Entities	Field Name	Opt.	Value Constraints
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Local System IP Address or Destination Host IP Address or User ID
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used
	ParticipantObjectDetail	M	Type = “Alert Description” and Value = Free text description of the nature of the alert. It is base-64-encoded data
	ParticipantObjectDescription	U	Not Used
	SOPClass	U	Not Used
	Accession	U	Not Used
	NumberOfInstances	U	Not Used
	Instances	U	Not Used
	Encrypted	U	Not Used
	Anonymized	U	Not Used
	AuditEnterpriseSiteID	U	Not Used
	AuditSourceID	M	The value configured in the Audit Message Settings page
	AuditSourceTypeCode	M	2

12.2.9 Patient Record

This message describes any event for which a patient record is created, updated or deleted. The Fixed RAD system generates this audit event when patient data is created or updated or deleted from the system.

Table 12-10 Audit Message for Patient Record

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110110, DCM, "Patient Record")
	EventActionCode	U	▪ If a patient is created, the value will be “C”. ▪ If viewing patient data, the value will be “R”. ▪ If updating patient data, the value will be “U”. ▪ If deleting patient data, the value will be “D”
	EventDateTime	M	Internally generated in UTC format
	EventOutcomeIndicator	M	▪ If patient data is created, updated, viewed, deleted successfully, the value will be 0. ▪ If patient data fails to be created, updated, deleted, the value will be 4
	EventTypeCode	U	Not Used
Active Participant:	UserID	M	Process Name
	AlternativeUserID	U	Not Used
	UserName	U	“Process Name”

Real World Entities	Field Name	Opt.	Value Constraints
	UserIsRequestor	M	Value is “FALSE”
	RoleIDCode	U	EV (110153, DCM, " Source Role ID")
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Active Participant: Persons and or processes that started the Application	UserID	M	User ID of the user who logs into the system
	AlternativeUserID	U	Not Used
	UserName	U	Not Used
	UserIsRequestor	M	Value is “TRUE”
	RoleIDCode	U	Not Used
	NetworkAccessPointTypeCode	U	Not Used
	NetworkAccessPointID	U	Not Used
Participant Object	ParticipantObjectTypeCode	U	Value is 1
	ParticipantObjectTypeCodeRole	U	Value is 1
	ParticipantObjectDataLifeCycle	U	Not Used
	ParticipantObjectIDTypeCode	M	Value is EV (2, RFC-3881, “Patient Number”)
	ParticipantObjectSensitivity	U	Not Used
	ParticipantObjectID	M	Patient ID anonymized
	ParticipantObjectName	U	Not Used
	ParticipantObjectQuery	U	Not Used
	ParticipantObjectDetail	U	Not Used
	SOPClass	MC	Not Used
	Accession	U	Not Used
	MPPS	U	Not Used
	NumberOfInstances	U	Not Used
	Instances	U	Not Used
	Encrypted	U	Not Used
	Anonymized	U	Not Used
	ParticipantObjectContainsStudy	U	Not Used
Audit Source	AuditEnterpriseSiteID	U	Not Used
	AuditSourceID	M	The value configured in the Audit Message Settings page
	AuditSourceTypeCode	M	2

Chapter 13 Secondary Capture Image Information Object Implementation

13.1 Introduction

This section specifies the use of the Secondary Capture (SC) Image IOD to represent the information included in SC IOD produced by this implementation. Corresponding attributes are conveyed using the module construct. The contents of this section are:

Section 13.2 SC Image IOD implementation

Section 13.3 IOD module table

Section 13.4 Information module definitions

13.2 SC Image IOD implementation

The Secondary Capture (SC) Image IOD specifies images that are coverted from a non-DICOM format to a modality independent DICOM format.

E.g. Workstations that construct images that are encoded as a screen dump.

13.3 IOD module table

3.

Table 13-1 IOD Module table

Entity Name	Module Name	Usage	Reference
Patient	Patient	Used	4.6.1.1 Patient module
	Clinical Trial Subject	Not Used	N/A
Study	General Study	Used	4.6.2.1 General Study module General Study module
	Patient Study	Used	4.6.2.2 Patient Study module
	Clinical Trial Study	Used	4.6.2.3 Clinical Trial Study Module
Series	General Series	Used	13.4.1.1 General Series Modules
	Clinical Trial Series	Not Used	N/A
Equipment	General Equipment	Used	4.6.4.1 General Equipment module
	SC Equipment	Used	13.4.2.1 SC Equipment Modules
Image	General Image	Used	13.4.3.1 General Image module
	General Reference	Used	13.4.3.2 General Reference Module
	Image Pixel	Used	13.4.3.3 Image Pixel Module

Entity Name	Module Name	Usage	Reference
	Device	Not Used	N/A
	Specimen	Not Used	N/A
	SC Image	Used	13.4.3.4 SC Image Module
	Overlay Plane	Not Used	N/A
	Modality LUT	Not Used	N/A
	VOI LUT	Not Used	N/A
	ICC Profile	Not Used	N/A
	SOP Common	Used	13.4.3.5 SOP Common Module
	Common Instance Reference	Not Used	N/A

13.4 Information module definitions

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the SC Image Information Objects.

The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that Attributes not present in tables are not supported.

13.4.1 Common Series entity modules

13.4.1.1 General Series Modules

This section defines the Attributes of the SR Document Series. A Series of SR Documents may contain any number of SR Documents.

Table 13-2 General Series Module table

Attribute name	Tag	Type	Attribute description
Series Date	(0008,0021)	3	The system sets it to today's date when generating a new series.
Series Time	(0008,0031)	3	The system sets it to current time when generating a new series.
Modality	(0008,0060)	1	Defined Terms: DX = Digital X-Ray
Series Description	(0008,103E)	3	The value is filled as "X-Ray AI Findings" (or) The value is filled as "Patient Position SC" for Patient Position SC image
Series Instance UID	(0020,000E)	1	UID is generated by the system.
Series Number	(0020,0011)	2	The value is filled as "999" The Value filled as Processed Image series number + 1 for Patient

13.4.2 Common Equipment entity module

13.4.2.1 SC Equipment Modules

Table 13-3 SC Equipment Module table

Attribute name	Tag	Type	Attribute description
Conversion Type	(0008,0064)	1	Describes the kind of image conversion. Value = “SYN” SYN - Synthetic Image

13.4.3 Common Image entity modules

13.4.3.1 General Image module

Table 13-4 General Image Module table

Attribute name	Tag	Type	Attribute description
Instance Number	(0020, 0013)	2	Incremental value starting from 1
Patient Orientation	(0020, 0020)	2C	Empty value
Image Comments	(0020, 4000)	3	"Pneumothorax" for PTX "Pneumonia" for PNE “Patient Position SC” for Patient Position Image.
Image Type	(0008, 0008)	3	"DERIVED/SECONDARY"
IrradiationEventUID	(0008, 3010)	3	Unique identifier of the irradiation event associated with acquisition of the image

13.4.3.2 General Reference Module

Table 13-5 General Reference Module table

Attribute name	Tag	Type	Attribute description
Source Image Sequence	(0008, 2112)	3	
>Referenced SOP Class UID	(0008, 1155)	1	1.2.840.10008.5.1.4.1.1.1.1.1 (SOP class of DX Processed)
>Referenced SOP Instance UID	(0008, 1155)	1	SOP Instance UID of DX Processed image for AISC Image (or) SOP Instance UID of DX Raw image for Patient

13.4.3.3 Image Pixel Module

Table 13-6 Image Pixel Module table

Attribute name	Tag	Type	Attribute description
Samples per Pixel	(0028, 0002)	1	Value = 3 or 1
Photometric Interpretation	(0028, 0004)	1	Value = RGB or MONOCHROME2
Rows	(0028, 0010)	1	Number of rows in the image
Columns	(0028, 0011)	1	Number of columns in the image
Bits Allocated	(0028, 0100)	1	Filled with value 8
Bits Stored	(0028, 0101)	1	Filled with value 8
High Bit	(0028, 0102)	1	Filled with value 7
Pixel Representation	(0028, 0103)	1	Filled with value 0
Planar Configuration	(0028, 0006)	1C	Filled with value 0
Pixel Aspect Ratio	(0028, 0034)	1C	Filled with value “1\1”
Pixel Data	(7FE0, 0010)	1C	Image pixel data

13.4.3.4 SC Image Module

Table 13-7 SC Image Module table

Attribute name	Tag	Type	Attribute description
Date of Secondary Capture	(0018, 1012)	3	Filled with current date of the system
Time of Secondary Capture	(0018, 1014)	3	Filled with current time of the system
Acquisition Date Time	(0008, 002A)	3	Filled with Acquisition Date time of Raw Image for Patient Position SC image.
Acquisition Date	(0008, 0022)	3	Filled with Acquisition Date of Raw Image for Patient Position SC image.
Acquisition Time	(0008, 0032)	3	Filled with Acquisition time of Raw Image for Patient Position SC image.

13.4.3.5 SOP Common Module

Table 13-8 SOP Common Module table

Attribute name	Tag	Type	Attribute description
SOP Class UID	(0008, 0016)	1	Filled with value "1.2.840.10008.5.1.4.1.1.7"
SOP Instance UID	(0008, 0018)	1	UID is generated by the system.
Specific Character Set	(0008, 0005)	1C	One of the characters sets listed in section 4.1
Instance Creation Date	(0008, 0012)	3	Filled with current date of the system
Instance Creation Time	(0008, 0013)	3	Filled with current time of the system

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